

The Gameful Museum:
Developing a Location-Based Game Design Framework for Engagement
and Motivation

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Doctor of Philosophy in English

January 2019

The Gameful Museum:
Developing a Location-Based Game Design Framework for Engagement and
Motivation

Submitted by Sofia Romualdo de Carvalho to the University of Exeter

as a thesis for the degree of

Doctor of Philosophy in English

In January 2019

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Abstract

The popularity of location-based games, which blend digital and physical gameplay in specific real-world locations, has been rising in recent years. Research in museum studies looking into these games as engagement tools has so far been limited to individual case studies or sporadic overviews of play and games that do not explore the relationship between game design, location, gameplay and the museum experience. This practice-led thesis addresses this gap through the development of a game design framework and guidelines to create location-based games in museums, combined with a study of the impact of the designed experiences on audiences' motivation to visit and engage with museum content. The findings and framework proposed are relevant for museum professionals and game designers who are interested in developing this practice while benefiting from guidance grounded in real-world research.

Methodologically, I supplemented a study of past experiences with a first-person gameplay analysis, the results of which informed the design and examination of case studies of games for Exeter's Royal Albert Memorial Museum & Art Gallery (RAMM) developed in collaboration with the museum staff and external game designers. Findings suggest that location-based games benefit museums by creating added motivation to visit, attracting new and existing audiences, increasing and diversifying engagement with the museum content, and to a lesser degree, supporting knowledge acquisition. Structuring visits into games limits the possible actions of players while offering agency within those limitations, making the players part of a story and giving them challenges to complete, encouraging visitors to become more active and invested in exploring the space and the content displayed.

I conclude this thesis by proposing the concept of the gameful museum as a possible path for museums as institutions of learning and entertainment, offering the location-based game design framework as an instrument to work towards audience development and engagement and highlighting the field's future potential.

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Acknowledgements

This investigation was made possible by a studentship awarded by the University of Exeter and the Royal Albert Memorial Museum & Art Gallery. I would like to express my deepest gratitude to Gabriella Giannachi and Rick Lawrence, my supervisors at Exeter and RAMM respectively, for their mentorship, unwavering support, insightful feedback, advice and encouragement. Thank you also to John Plunkett, my second supervisor, for the feedback and guidance, and to Lúcia Matos for the ongoing support, mentorship and friendship.

I would like to thank everyone at RAMM, including, but not limited to, Julien Parsons, Holly Morgenroth, Helen Burbage, Thomas Cadbury, Jenny Durrant, Tony Eccles, and James Richardson, for welcoming me into their institution and offering me support and a community throughout this process. I would also like to extend my thanks to the game creators involved in the design and development of the case studies for this investigation: Adam Clarke and his family, James Delaney and the rest of the Blockworks team, Ben Pering, Mark Nicholls and the rest of the Red House Mysteries team, for their contributions and for generously agreeing to be interviewed.

Thank you also to Blast Theory, Fire Hazard Games and the Mixed Reality Lab at the University of Nottingham for hosting me as a researcher-in-residence during this investigation, and to the various academics, game designers and museum professionals who discussed ideas with me.

A heartfelt thank you to my friends Ana, Catarina, Joana, André, Nelson, Nuno, Amy, Ziz, Tony, Gwyn, Steve, Patricia, Pedro, Siân, Ben and Acatia for the emotional support, for the feedback on my work, and for making me feel at home in Porto, Exeter, and London.

Last, but not least, thank you to my family, Esmeralda, Artur and Filipe, for their encouragement and for remaining my biggest life-long supporters.

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Author's Declaration

This declaration serves to clarify the nature and extent of my involvement with the development and implementation of the case studies at RAMM, as well as declare my professional involvement with Fire Hazard Games.

The Great Exeter Garden Quest: I created the quest, using a pre-existing platform, requesting additional features to the platform's maintainer. I was not involved with the development of the platform, the current version of which was funded by Research and Enterprise in Arts and Creative Technology - Higher Education Innovation Funding (REACT-HEIF) in 2013 and built as a collaboration between RAMM, the Centre for Intermedia at the University of Exeter, 1010 Media, and Exeter City Football Club Supporters Trust.

Minecraft at RAMM: I created the design document, with an outline of the experience, design specifications, and objectives. Adam Clarke designed the maps and managed the work of the Blockworks team, who built the maps. Rick Lawrence and I accompanied the process and offered feedback, as well as keeping the rest of the RAMM team updated on the progress. Clarke also oversaw the organisation of the Minecraft Days, in collaboration with myself and the RAMM staff. *Minecraft* was created by Markus Persson, developed by Mojang and is now owned by Microsoft.

The Rowley Riddle: I created the design document, with an outline of the experience, design and story specifications, and objectives. Ben Pering and Mark Nicholls of Red House Mysteries designed and produced the game. Rick Lawrence and I accompanied the process and offered feedback.

The data gathering process for each case study was previously approved by the University of Exeter's College of Humanities' Ethics Committee.

I first played a Fire Hazard Games experience (Raiders of the Lost Archive: A Curatorial Cold Case at the Victoria and Albert Museum) as a paying customer in August 2017, as part of this investigation. I contacted and met Elizabeth Simoens in November 2017, enquiring about the possibility of joining the company as a researcher-in-residence (as I had previously done in June – July 2016, when I joined Blast Theory in Brighton). I joined Fire Hazard Games in residence starting in January 2018, intending to finish my residency by April 2018. In April, the

company invited me to work for them a few hours a week as tech support in their then upcoming (non-museum) game, *The Hunted Experience*, developed in partnership with Endemol. Having entered the writing up stage of the thesis, I began working for them in this and other games. Towards the end of the writing up period (September 2018, the deadline for this thesis and when my scholarship ended), they invited me to contribute to their museum games as a freelance game designer, including a game for Cambridge Museums (*Operation Survival*) and new *Raiders of the Lost Archive* games for the Museum of London (*Raiders of the Lost Archive: Quest for the Family Ghouls*) and the Victoria and Albert Museum of Childhood (*Raiders of the Lost Archive: A Christmas Quarrel*). They offered me a part-time contract with the company in November 2018, which I accepted. At the time of submission of this thesis (January 2019), I remain as a part-time worker for the company. Any games that I was involved in making are not mentioned in this thesis, and the data on their games was collected before my professional involvement with the company began.

Introduction

Within the field of pervasive games, which are played in real-world spaces, location-based games is a denomination given to games that are built to be played in specific locations, incorporating them into the design so that the resulting game can only be played in those locations. My interest in studying the use of location-based games to promote engagement with museums grew from my professional and personal background. On a personal level, my identity as a gamer, which began at a very young age, gradually evolved into an interest in different types of games, not just as entertainment, but also as artefacts and experiences with cultural and artistic value. Professionally, after studying contemporary art, I worked as a museum curator and researcher in the context of contemporary art and heritage institutions in Portugal. There, I began to consider the possibilities and advantages of videogames becoming an integral part of digital engagement toolboxes for museums, eventually starting a Master's course in Curatorial and Museum Studies, and deciding to dedicate my thesis to that topic. The initial inspiration to engage in this research came from researcher and game designer Jane McGonigal, who in 2008, during a discussion on games and the future of museums organised by the American Alliance of Museum's Center for the Future of Museums, said that museums should work more like game worlds, that is, provide clear goals, feedback, and social interactions integrated into a story (McGonigal, 2008). Between 2010 and 2013, I researched museums around the world that had experimented with creating videogames to be played online or as gallery interactives, and noted a smaller number of institutions that had gone beyond that to create more experimental and multi-layered game-like experiences for the physical spaces of their galleries. These types of games hinted at a future in which museum visits, by being re-structured into games, could become more active, playful, creative and imaginative, as well as informative and inspirational.

This initial research consolidated my belief that games have the potential to make players more intrinsically motivated to initiate a visit to a museum and to engage more deeply and in different ways while they are there, potentially creating new audiences and engaging existing ones. I became particularly interested in understanding how museums could go further than creating traditional videogames, most of which do not necessarily encourage players to physically

visit the museum during or after gameplay as they can be played elsewhere if shared through a museum's website. While this approach has applicability in reaching audiences that may be too far away or lack the resources to physically visit the museum, from my perspective as a former museum professional, I am more interested in developing experiences that complement and enhance visits to the physical space of museums, in discovering how effective they are at motivating people to visit museums and making them feel engaged and invested in their content. With the rise in popularity of location-based games such as *Pokémon Go* (Niantic, 2016), which blend digital and physical spaces, and other game-like or gameful experiences, such as live cinema and immersive theatre with game elements, the time seems right for museums to engage with these developments, which led me to this investigation on the study and the design of location-based games as engagement tools for museums.

While videogames, alternate reality games, live-action roleplaying games and other game experiences have been adopted or developed by museums and other cultural institutions in recent years to promote engagement, the study of these experiences has generally been done in a case by case manner by individual museums or by those involved in a particular project. The few exceptions to this, notably the overview of case studies of play and games in museums edited by Katy Beale (Beale, 2011), compile reports on various types of games, including location-based games, but do not focus on the relationship between design, location, gameplay and the museum experience. The development of a framework of design guidelines to create location-based games in museums, and a systematic study of the impact of those experiences on the ways that visitors engage with museums, has yet to be done in an academic context. A framework of design practices derived from tested methods is particularly useful for museums, which do not necessarily have the resources or time to invest in experimental projects. The development of this framework, which answers the question of how to design location-based games for museums that promote engagement and motivation to visit, became the primary research problem to be addressed in this PhD by practice. In order to do this, this practice-led investigation focuses on the design and analysis of different types of location-based games in museums, studied from two perspectives, design and gameplay. As a player-researcher, I engage in critical gameplay of existing location-based

games in museums in order to reflect on the game design strategies used. As a researcher and practitioner embedded in the Royal Albert Memorial Museum and Art Gallery, I engage in the collaborative design and development of three games using different game mechanics and game design strategies. I systematise findings from these perspectives in order to draw out conclusions on how different game elements, mechanics and design strategies can impact the museum experience and encourage people to visit and engage with museums. Through the analysis of the experiences designed and reflection on the game design process, I develop a game design framework with applicability across museums. This framework is the main output of this practice-led research process. In summary, with the conclusions drawn from research on past experiences, in addition to my own first-person gameplay experience, combined with the development and implementation of design strategies, and the study of other players' experiences during gameplay, I develop a framework of location-based game design strategies for museums, aimed at both museum professionals and game designers, to be adopted by institutions in order to enhance the experience and engagement of their visitors.

Following this investigation, my findings suggest that experiences created through the use of location-based game design strategies offer benefits to museums on the following levels: motivation to visit, increased engagement with the museum and its contents, and to a lesser extent, knowledge acquisition. Location-based games make people more motivated to visit, attracting two main visitor groups: dedicated visitors who feel a particular museum does not have anything new to offer them, so that they need new ways to experience the same content in order to have a reason to come back; and people who are not regular visitors, and in some cases have never visited before, but who are game players and are attracted to the museum by the opportunity to play games in a new environment. Moreover, these games improve engagement, that is, the attention given to and involvement of visitors with the content that museums have to offer. By structuring visits into games, giving players agency within a designed structure, limiting their possible actions but offering them meaningful choices within those limitations, making them part of a story or giving them challenges to complete, players become more active and invested in exploring the space and discovering more about the artefacts on display. Finally, during gameplay,

players engage with the content, acquiring and remembering the information they come across as a by-product of gameplay. While motivation and engagement, and not learning, were the primary aims of the case studies, the opportunity was taken to sound out how gameplay experiences influence knowledge acquisition. Findings suggest that these games are not necessarily conducive to learning, which is perhaps unsurprising considering that the strength of games does not necessarily lie in their potential to teach, but in their potential to absorb player's attention and make them feel motivated to keep engaging in gameplay. I observed what can be referred to as stealth learning, that is, learning not as a conscious target, but as a secondary outcome of the gameplay; nevertheless, the main advantages lie elsewhere.

The interdisciplinary nature of this investigation required the adoption of different perspectives in the course of undertaking this practice-led PHD. My first position is that of a researcher focusing on theory and history, looking at games, game elements and mechanics and their effects on gameplay, game design strategies and their outcomes, as well as examples of existing and past location-based games in museums. I also adopted the perspective of a researcher who is a player, engaging in a critical analysis of my own gameplay experiences, informed by autoethnographic methodologies. The experiential nature of games, which translates into a necessarily limited knowledge of the gameplay experience of games I did not have access to, led me to focus primarily on the analysis of experiences that were directly available to me at the time of writing, while my perspective on past cases had to take into account the limitations inherent in studying gameful experiences that I did not play or design directly, or which are no longer available to play. Besides documenting and analysing my experience when playing existing games in museums, I acquired the practical perspective of a contributing designer by collaborating with game designers to create case studies of games for Exeter's Royal Albert Memorial Museum & Art Gallery (henceforth referred to in this thesis as RAMM). These experiences were then studied from the perspective of several players, in order to get a more diverse gameplay perspective than that afforded by the study of a single player's experience, which, no matter how critical and informed, is necessarily limited and biased. I discuss this methodology in more detail in the next section of this chapter.

The context of RAMM as a testbed for the design strategies developed in this thesis was invaluable as a real-world background to the development of best practices regarding location-based game design strategies. Being location-based, a large part of the conclusions drawn here are dependent on where the experiences take place; however, this thesis is not meant to focus exclusively on the context of this particular museum. Instead, the scope of this research project comprises public museums in the United Kingdom. This context has its own characteristics, such as the fact that museums in this country are publicly funded institutions with free access to their permanent exhibitions and an ethos of inclusivity and openness to everyone. These characteristics in turn influence the way their staff works, the motivations, engagement and interpretation of the people who visit them, and the types of experiences they can have there. The research findings analysed in the conclusion may have implications across broader contexts, particularly if they share characteristics with the context of the United Kingdom; however, their applicability to institutions in countries in which the museum and heritage industry are markedly different in terms of access, logistics and focus is a line of investigation to follow in the future. Moreover, different cultures may translate into different visitor attitudes, not just in terms of how they visit museums and engage with their content, but also in how they relate to games and play. This investigation plots and analyses the field in the specific context described, with the hope that the approach developed here proves useful to museum professionals elsewhere. Further experimentation and study conducted in different contexts is one of the possible strands of further research that I identify in the conclusion. As it stands, the findings and framework presented in this thesis are relevant for both museum professionals and game developers in various contexts who are interested in exploring this practice with guidance grounded in real-world research.

The overarching research question for this investigation is to determine how specific location-based game design strategies and experiences can be used to motivate people to visit museums and to improve visitors' experiences and engagement in museums. The aim of this investigation can be defined as twofold, following the main strands of game design and gameplay experience. The first objective is to study, develop and determine strategies to implement location-based game design in museums. These strategies and the resulting experiences

are developed and implemented in collaboration between myself as a researcher, the museum staff, and different game developers external to the institution. The result is a framework of design guidelines and strategies directed at interdisciplinary teams comprised of museum professionals and external game designers. The second objective is to observe, document and analyse how the resulting games are played by visitors, and how the players engage with the museum and its contents during gameplay, in order to determine the effects of that gameplay in their motivation and engagement and, to a lesser extent, knowledge acquisition. During the course of this investigation, in order to build context, I study past and current practices in the field of location-based game design for museums. Following the path already taken by several scholars in the field of game studies, who have studied different facets of what has been referred to as a gameful world (see Raessens, 2014 for a study of the ludic turn in culture), I conclude this thesis by proposing the concept of the gameful museum as a possible path that respects the museum's nature as an institution between entertainment and learning, offering the location-based game design framework as an instrument for museum professionals to work towards it, and suggesting its future potential.

To summarise, after mapping the theory which informs the creation of location-based game design, I look at location-based games in museums as a practice – through the process of design, development and application of games – and as experiences – in the analysis of the resulting experiences, as well as games created elsewhere. I contribute to the fields of museum studies and game studies by creating a framework that allows institutions and their staff to collaborate with game designers to develop location-based games for their museums, and to the field of game studies by opening up and mapping out the context of museums as a prime environment for the development of games that respond to the environment in which they are played.

Collaborative PhD Studentship with RAMM

As mentioned, to ensure that this research project and the resulting design framework have an application in the real-world, this investigation needed a museum as a testbed with realistic expectations and resources in terms of funding, time, and staff. The RAMM in Exeter was the main testing ground for the design and development of location-based game experiences. With a history of

developing diverse and award-winning digital experiences that enhance the ways visitors can experience the museum, RAMM provides a welcoming environment to games, museum staff who are experienced with digital technologies and keen to continue developing and adopting new technologies, and a community that embraces and expects a diverse offering of experiences that use different technologies to enhance the ways they can visit the museum. Moreover, the museum has, in recent years, thoroughly developed both its physical and digital offering: an extensive building renovation and revamping of exhibits and galleries has occurred concurrently with the digitisation of thousands of objects in the collections, as well as the development of a responsive website, and several digital applications that can be adapted by visitors for their own needs. Since the renovation, RAMM has been collaborating with the University of Exeter to develop experimental digital projects for outreach and engagement. The present investigation is part of that ongoing collaboration.

Engaging in a collaborative PhD has implications not just in terms of where the research is conducted, but also in the type of work developed and knowledge produced. The expectation for a researcher engaged in an investigation with a practical side, while embedded in a museum context, is that the work produced has practical value and application within the museum and beyond. For RAMM, this value took the form of the location-based games produced, the dissemination of knowledge in industry and academic events, and in the formulation of the game design framework. The contribution to knowledge from this investigation is not purely academic, but also practical in the sense that it has real-world applicability.

The research undertaken within this thesis was supported by a studentship awarded by the University of Exeter and the RAMM. This collaborative PhD project was funded by REACT (Research & Enterprise in Arts & Creative Technology), a collaboration between the University of the West of England - Bristol, Watershed, and the Universities of Bath, Bristol, Cardiff and Exeter, which was supported by the Arts and Humanities Research Council (AHRC), with the aim of fostering collaborations between arts and humanities researchers and creative businesses.¹ Different projects developed at RAMM were supported by particular entities: part of the *Minecraft at RAMM* project, as well as *Gamerama*,

¹ More information can be found in the REACT website: <http://www.react-hub.org.uk/> (accessed 21 June 2018).

a group of game-related activities which were developed as part of this collaborative research project, but which are not directly referenced in this thesis, were funded by Arts Council England as part of RAMM's Major Partner Museum funding.² The remainder of the *Minecraft* project, including the *Minecraft Days* events and maps for Roman and Tudor Exeter, were funded by the public engagement strand of the *Exeter – A Place in Time* project, a collaboration between the Archaeology Departments from the Universities of Exeter and Reading, Historic England, Cotswold Archaeology, the Exeter City Council, and RAMM.³ The studentship was originally created under the title "Playing with heritage: a historical and practical investigation of gamification in the heritage museum". However, the project evolved to focus on location-based game design, rather than gamification, due to the fact that the word gamification tends to be primarily associated with marketing purposes, that is, encouraging certain behaviours from customers and rewarding their loyalty, whereas the focus of this thesis is on improving visitors' experience, not from a marketing perspective, but by enhancing engagement and interpretation, using design practices inspired by and using structures from games and game design. The distinction is further clarified later in this thesis.

Areas of Study and Methodologies

The nature of this project, that is, the study of game design and gameplay experiences within the specific context of museums, makes it inherently interdisciplinary, which in turn influences the methodologies adopted. In order to understand the personal nature of gameplay, in conjunction with generalised playing habits, how they are influenced by game design, and how the resulting gameplay impacts the museum experience, this investigation is grounded in two areas of study: game studies and museum studies.

The main area of research this thesis is situated in is game studies, as it focuses on the development and testing of game design strategies and the study of

² More information about this funding stream can be found in the Arts Council website: <https://www.artscouncil.org.uk/our-investment-2015-18/major-partner-museums> (accessed 21 June 2018). *Defend Exeter*, a videogame created by students from Exeter College as the result of a game jam organised by RAMM as part of my research project, was funded by a mix of the HLF money for digital engagement with the Seaton down Hoard project and ACE MPM funding.

³ For more information about *Exeter - A Place in Time*, see the project's website: http://humanities.exeter.ac.uk/archaeology/research/projects/place_in_time/ (accessed 21 June 2018).

gameplay experience. It is heavily informed by museum studies, insofar as the analysis of the museum experience is concerned, as museums are the testbed and context for which the games are created. As such, as part of this investigation, I look at scholarship on museum visitors' experiences and engagement. It should be noted that both areas of study, games and museums, are themselves fields of research informed by theories and methodologies from other areas. In particular, game studies, as focused in digital and hybrid games, is a relatively recent academic discipline, having been established around two decades ago (Aarseth, 2001). This means that many games scholars are academics who have either started in other fields or who adapt methodologies from other fields to fit the nature of games. Games have been studied from different perspectives, using various methodologies adapted to the particular aspects being studied and the characteristics of the game, such as whether it is an analogue game, a digital game, a location-based game, or another type of game.

Museum studies also draw on various theoretical and practical underpinnings, depending on the specific aspect of the museum experience under scrutiny and the department that is conducting the research. My perspective in game studies is that of a co-designer and player, whereas in museum studies, my perspective is from an engagement point of view, which can be considered as transversal to the institution. This thesis is also informed, in a less prominent way, by performance and theatre studies, psychology and human-centred design. Performance and theatre scholarship aids the study of games that rely on performance and roleplay from their players, and which immerse those players in constructed environments, either through directly intervening upon locations or by adding a game layer to them. Psychology scholarship is useful in terms of understanding human motivations and responses to rules, goals, rewards, collaboration, competition, and other game mechanics. Human-centred design, a design philosophy and approach that 'puts human needs, capabilities, and behaviour first, then designs to accommodate those needs, capabilities, and ways of behaving' (Norman, 2013 [1988], p. 8), is useful as the game design strategies are primarily concerned with the effects they have on player experience and engagement in museums, rather than focusing exclusively on specific technologies and mechanics.

The interdisciplinary nature of this research required me to develop a set of methodologies that respected and fit both areas of study, allowing for a theoretical and practical research project and remaining rigorous, while acknowledging that my research questions are not suited to the exclusive use of quantitative methods of data gathering and analysis. The dynamic and rapidly changing context of game design, as well as the multivalent nature of both the strategies developed and the resulting experiences, necessitates versatile methods that can properly account for the diversity of case studies. All research projects have constraints, and this investigation is no exception insofar as the aim to create a framework for developing location-based games for museums is a difficult task to undertake with limited time and resources. Keeping in mind the impossibility of creating a complete overview, analysis and development of all possibilities regarding location-based games in museums, I decided on the design of a qualitative, interdisciplinary study with methodologies adapted from both areas of study mentioned.

Working as an embedded researcher and practitioner in a museum, engaging in collaborative design and development of game experiences as an integral part of the investigation, led to the framing of this research project as practice-led research. Practice-related research can be categorised as either practice-based, if the created artifact in itself forms the basis of the contribution to knowledge, or practice-led, if the research leads primarily to new understandings about practice (Candy 2006). The emphasis of practice-led research is on creating solutions to a perceived problem (Scrivener 2000, Hamilton and Jaaniste 2009) by developing outcomes with operational significance that inform the nature of practice itself, such as 'principles, models, frameworks and guidelines' (Candy and Edmonds 2018, p.64). This investigation is practice-led as my primary focus is to advance understanding of the practice of location-based game design for motivation and engagement in museums, and to create new knowledge in this emerging field through the development of a design framework with practical applicability. While the practice is undertaken in the specific context of RAMM, it is not limited in applicability to that context, but rather seeks to inform the creation of a design framework and therefore contribute to wider knowledge. Practice is an integral part of my methodology to generate a game design framework and guidelines which can be used by museum professionals and game designers,

with the goal of creating experiences that motivate visitors to go to museums and engage them with the museum content. The contribution of this research is not solely found on the experiences that were designed, but on the insights into the process that led to their creation, and ultimately, on proposing a new design framework and guidelines for an emerging field.

Methodology: Theoretical Foundations

In order to establish a theoretical foundation for the investigation, and to outline the concepts and definitions that are used throughout the thesis, I begin by developing an overview of play, games, and the nature of gameplay experiences, with a particular focus on location-based games. To conduct this research I used academic journals, books, magazines and blog articles, attended academic conferences, undertook research residencies with game creators, participated in industry events in both fields, and interviewed various game designers and museum professionals. I also studied immersive experiences with gameful characteristics, such as live cinema, in order to identify how location is considered by these interactive gameful experiences, and the possibilities that emerge when different experiences and locations are re-structured as games.

In addition to introducing the work in the field and establishing the language used, this overview informs the methodology by looking into the methods employed by other game scholars and identifying design strategies that can be adopted and tested. Throughout the investigation, I take these design lessons and decide how to apply them in conjunction with other methods employed by museum professionals to foster visitor engagement. One important takeaway is that one of the main concerns of museums is to emphasise their status as physical destinations, which people can visit to have experiences grounded on physical objects. Therefore, I argue that incorporating the physical characteristics of the museum, as not only the context for play, but an integral part of the gameplay experience, is of interest to museums. Likewise, as I explore in the discussion of my findings, I support the idea that museums are of interest to game studies and game creators in that they represent a productive context for the development of location-based games. This is because museums are places that combine physical characteristics and artefacts with specific meanings, stories and histories. Museums offer game scholars and developers content and knowledge

that can be tapped to create games, but also a sandbox in which to experiment with design strategies that can then be applied in other contexts.

Methodology: Location-Based Game Design

The practical side of this investigation focuses on two main lines of analysis: location-based game design, and gameplay as part of the museum experience. Location-based game design is used here as a key part of the methodology of my practice-led research process, as it informs the creation of solutions to the defined problem – how to design games for motivation and engagement in museums – with the outcome structured as a design framework with general applicability. The design process for each of the games created follows a structure that is reflected in the game design framework (see Appendix B, Appendix C and Appendix D). In this process, after the examination of literature on game elements and mechanics, from videogames to pervasive games, I identify a range of location-based game design strategies and study examples of past and existing museum games in which those principles were applied (see Appendix A.1). I then develop design briefs with strategies that can be applied in RAMM, creating game design documents listing the aims of each project, how it fits into the investigation, the gameplay to be facilitated, the content included, a timeline for completion, and the people involved (see Appendix B.1 as an example). These documents evolve as I engage in an iterative and collaborative process with game developers external to the museum to build upon those design briefs to create games that are then used as case studies. I document the design process and conduct semi-structured interviews with these game creators regarding their methods (see Appendix D.2 as an example), in order to acquire a more complete perspective of the production practice.

The creation of a framework of guidelines and practices regarding the design of these experiences has the aim of helping museum professionals and game designers understand how they can use location-based games to improve the museum experience, so this thesis is concerned not only with design strategies, but also with how they influence gameplay during the museum visit. The focus of a game designer is ‘designing *game play*, conceiving and designing rules and structures that result in an experience for players’ (Salen and Zimmerman, 2003, p. 2). This framework is directed at both game designers and museum professionals, advocating for a collaboration between them. The collaboration

between practitioners from both fields was critical for the investigation, and I believe the same can be said for the design of games for museums outside academic research, which should be based on collaboration between the museum and external creators. The design process in this investigation was a collaboration between myself, the museum team, comprising of my supervisor and the Collections department, and external game designers. For my part, the study of design and gameplay overlaps in that I conduct research into design strategies by analysing existing games, in an attempt to discern the game elements and mechanics used and their effect on gameplay and the museum experience. This is based on the premise that there are correspondences between certain game elements, mechanics, and design strategies, and types of engagement, specifically in the context of visitors who are playing in the physical space of a museum. These strategies are then iteratively refined, developed and tested in the case studies at RAMM. This circular iteration can be described thus:

Establishing theory – existing examples - gameplay analysis – recognition of design strategies and effect on gameplay – application into design – documentation of design process – gameplay analysis – establishing theory – creation of location-based game design framework for museums

As mentioned in the previous section, the aim of developing and testing a framework of game design strategies means that any research undertaken cannot be easily separated from the institutional and physical context in which it is enacted. With RAMM, my position was that of an embedded researcher conducting ethnographically informed research in a museum context, who was present and participated in the activities of the Collections and Digital Engagement teams, and to a lesser extent, the Events team, while not entirely belonging to any of the departments or to the institution itself. This position is akin to that of Sharon Macdonald at the Science Museum (S. Macdonald, 2002), insofar as it allowed me to have an insider's perspective of the process of development, and not just the experiences that were designed and produced. This allowed me to keep a realistic view on what museums can achieve with location-based games, but also means that the findings could potentially be considered too specific to RAMM. One of the reasons why I decided to include a first-person gameplay study of other museums' games was to mitigate this specificity, as the aim was to create a framework that can be adapted by other

museums. This limitation was further mitigated by my undertaking research residencies with creators of location-based game experiences, such as Blast Theory (see chapter two; see also Appendices A.4.3, A.4.4 and A.4.5) and Fire Hazard Games (see chapter four; see also Appendices A.4.1 and A.4.2), during which I took the position of an embedded researcher conducting ethnographically informed research.

Methodology: Studying Gameplay

As a highly interactive medium, games cannot be studied solely as products of design; instead, they must be played, and the resulting gameplay must be studied. Designers of location-based games produce systems that enable certain types of interaction, but the ways these are actually played are ultimately up to the players. Hence, without a perspective of the experience of gameplay, this investigation would be incomplete. To determine and evaluate the results of the application of different game design strategies to the museum experience, I examine what players do and what they report feeling and thinking during gameplay. I conduct this analysis from two perspectives: a first-person perspective of my own gameplay experiences, and how they influence my experience with a museum, and a perspective from other players on the location-based games whose design I contributed to. When it comes to documenting and studying gameplay, types of gaming which deviate from traditional games, such as location-based games, require an adaptation of the methods traditionally used in order to take into account the unique aspects of the gameplay they afford, including the temporal, social and spatial expansion as compared to other games. The variety of experiences that fall under the designation of games, as well as the increasing influence of videogames in other areas of culture, leading to the emergence of gameful works and experiences, have raised new questions in the field of game studies. An interdisciplinary methodology becomes necessary to respond to the unique challenges raised by the hybrid nature of these gameful experiences.

Thus, in this thesis, to study the gameplay of location-based games, I propose the adaptation of existing game research methodologies, in an effort to respond to the characteristics of different games, which, as becomes apparent throughout this thesis, combine elements from digital and analogue games, performance, live-action roleplaying games and immersive theatre. What follows is an overview

of different methodologies which have informed the development of my own methodology to be used in this investigation. Location-based games have been studied extensively in recent years, using a variety of methodologies which do not exactly fit this investigation, as I need to take into account not just the gameplay and the way it involves and incorporates physical space, but also the specific context of museums and how the gameplay experience influences and intertwines with the museum visit. Since these methodologies do inform my own, it is useful to detail them here and explain how I have adapted them.

There are several methodologies and frameworks developed by game scholars in order to study the gameplay experience, many of which are focused on videogames, and so do not take into account the specificities of location-based games. Nevertheless, methodologies for the first-person study of videogames, such as those found in the work of Seth Giddings, are relevant as an approach that employs autoethnography for the documentation and analysis of gameplay. This results in rich descriptions of said experience which translate into an evocative sense of the gameplay experience, such as a description of *Lego Racers 2* (LEGO, 2001) that includes the circumstances that led to the game being played by the author's children, a rich description of the game, including interface, mechanics, gameplay, agency and aesthetics, and how the children engaged with the game outside of actual gameplay (Giddings 2006, p.99). Using video and participant observation, in which players and actions on screen are recorded, it is possible to overcome the limitations inherent both to studying other people's gameplay and to studying a first-person experience of gameplay, during which players may be too engrossed to reflect on their experience (Giddings and Kennedy 2008, p.14). Giddings uses the term 'microethnography' to describe a 'nonscientific, improvised, opportunistic approach to recording, describing, and analyzing brief moments of everyday technocultural activity' such as the transitory experience of gameplay (Giddings 2009, p.149). Using this methodology, Giddings studies gameplay not only as a media and cultural object, a set of technologies, or actions by a human subject, but as an event in which the three come together in the presence of the researcher (ibid). Even though the location-based nature of the games I experience as a player during this investigation is not suited to the direct application of this methodology, the small-

scale ethnographic approach to analysing gameplay informs my approach as a player-researcher in this investigation.

Of particular interest to my research aims is the study of pervasive games. Pervasive games,⁴ which can be defined as games that are played in and blend with physical environments, and include genres such as LARPs (live-action roleplaying games), alternate reality games, and treasure hunts, are usually studied through the use of interdisciplinary methodologies (Mäyrä, 2009). These methodologies include varied qualitative research strategies. Of relevance to this investigation, these include methods such as extensively documenting the design process, which is often iterative, with initial designs being tested, evaluated, and redesigned, with the artists reacting to and adapting the experience to the environment *in situ*; first-person participation in game sessions as a player, since the ephemeral moment of gameplay has to be experienced first-hand in order to be fully understood; and analysing the activities of other players, since each player will have their own playing style and make specific choices about which actions to take (Montola and Holopainen, 2012; Montola, Stenros, and Waern, 2009b; Stenros and Montola, 2010; Stenros, Waern, and Montola, 2012). These authors also refer to the added difficulty of studying these games, as their ephemerality makes their replay value and replicability difficult or even impossible (Stenros et al., 2012, p. 350). This had an impact in my choice of case studies for historical research, as I explain later in this section.

When it comes to specific methods for documentation and analysis, ethnography permeates this entire investigation. This is because engagement, gameplay and museum experiences are complex cultural processes that resist being reduced to quantitative data or being studied by controlled trials. Ethnographic and autoethnographic methodologies are commonly used in the study of digital games and virtual worlds (Boellstorff, 2006; Boellstorff, Nardi, Pearce, and Taylor, 2012; Giddings 2009; Konzack, 2002; Nardi, 2010; Taylor, 2006), and their usefulness extends to the study of games that are not exclusively digital. It is the main method I apply to the study of gameplay experiences, both my own and of others. The aim in this particular case is to document my experience in gameplay

⁴ The categories of pervasive games and location-based games overlap in that both types are played in real-world spaces, but differ in their relationship to those spaces. I go into more detail regarding these definitions in the next chapter of this thesis.

and how it affected my engagement with museums, and what design factors shaped that experience, taking into account my personal background and specific characteristics. My existing interest in both games and museums constitutes a potential bias that is mitigated by the inclusion of the gameplay experiences of other players, which are also studied through the use of ethnographic methods. In all case studies, I focus on gathering in-depth qualitative data from a small group of players, through the observation, documentation of gameplay activities, and individual and group semi-structured interviews. The specific ways in which ethnographic methods are applied are informed by the other methodologies referenced in this section.

Another methodological perspective that can be useful for the study of location-based games comes from human-computer interaction. The conceptual framework of using trajectories to study mixed reality experiences, which are often multimodal and employ different technologies and interfaces, is based on the analysis of these experiences as journeys through hybrid structures (Benford and Giannachi, 2011; Benford, Giannachi, Koleva, and Rodden, 2009). This methodology is especially useful to study experiences in which participants travel through different spatial, temporal, performative and technological structures, but which maintain a sense of coherence through a dynamic process of orchestration. Spaces can be physical and virtual, time can be related to story, plot, interaction and perception, participants can be performers and spectators, while different interfaces enable them to pass through these hybrid structures (Benford et al., 2009, p. 716). Many pervasive and location-based games can be categorised as mixed reality experiences. Of relevance to this investigation, this methodology has been employed to study the works of Blast Theory, an artist group who create innovative experiences at the intersection of games, immersive theatre, and performance, and whose work I study more extensively in chapter three. The notion of studying gameplay by looking at it not as a static experience, but as a journey that players go through different media and spaces, making choices but also being steered by the design, as well as the idea that these experiences require orchestration, informs the methodology for this investigation, both in terms of the design process and the study of gameplay.

Other useful methodologies can be found by looking at the study of location-based gameful experiences, that is, experiences that were not designed as and

cannot be categorised easily as games, but that incorporate game elements and mechanics into their structures, and which also take into account the physical location in which they take place. Examples of these include live cinema experiences and immersive theatre productions. Live cinema experiences, of which Secret Cinema is perhaps the most emblematic example in the United Kingdom, are events in which the screening of a film takes place in an immersive, multisensory and carefully constructed environment inspired by the world of the film on show, often with the addition of online spaces that can be interacted with before and after the experience (Atkinson and Kennedy, 2016). Secret Cinema gives participants a role or specific character to play during the experience, requiring them to acquire a costume and props to facilitate that role, effectively turning them into both extras and active participants in the constructed world. Participants can choose to follow instructions that lead to certain story lines, which may in turn lead to rewards in the form of, for example, personalised interactions and access to different parts of the space (Atkinson and Kennedy, 2015). Live cinema thus presents similarities to live-roleplaying games. The study of these experiences requires methodologies adapted to their complex, multimodal, immersive and interactive nature, combining 'discourse analysis, participant observation, in-depth interviews, ethnographic practices and the analysis of participant produced social media' (Kennedy, 2017, p. 683). Helen Kennedy and Sarah Atkinson also mention the importance of a first-person account of the researchers' experiences as embedded participants in the events studied (Atkinson and Kennedy, 2015; 2016, p. 254).

Sharing some characteristics with live cinema experiences, although requiring less preparation in terms of costume and props on the part of the audience, immersive theatre is a designation that has been used to describe a variety of theatrical productions which do not make use of a proscenium arch, and typically give the participants the freedom to wander around an evocative environment, giving them the choice of where to go, what parts of the story to engage with, which elements or characters to interact with, and how (Biggin, 2017, p. 2). The similarities and commonalities between immersive theatre and games have been explored by several authors (Biggin, 2017; Frieze, 2016; Romualdo, 2016). The agency and freedom given to the audience within the parameters or rules of the space, the interactivity afforded to them, the focus on each individual's personal

journey through the experience, as well as, in specific experiences, the explicit use of game technologies and mechanics, make these experiences gameful. Emblematic examples of groups whose work falls under this designation are UK-based Punchdrunk, Coney and Blast Theory. Studying immersive theatre experiences presents researchers with similar challenges to studying location-based games, insofar as they require various methods of data collection, often in the form of ethnographic observations and interviews, and also require the researcher's own attendance in events. As Rose Biggin asserts in relation to her study of Punchdrunk's work, this does not mean that the researcher's personal readings and responses are intended to be definitive; instead, they are there to provide a focus for discussion and to further illustrate the possibilities for interaction (Biggin, 2017, p. 13). In my own study of Blast Theory's work, conducted while on a research residency with the artists, I employed a similar methodology to that used throughout this thesis, and found the method advantageous to acquire a more complete perspective of the experience while respecting the hybrid nature of the work.

Considering the fact that I am studying not just the gameplay experience, but also the way that it impacts the museum experience and the engagement of visitors with the museum and its contents, it is useful to look at methodologies employed in museum studies. While early public museums tended to favour the collection and care of objects, the focus has since shifted to visitors and the experiences they have, particularly when it comes to learning and interpretation, but also in terms of engagement and in encouraging people to visit the museum. With engagement at the heart of this investigation, it goes beyond the scope of my research to consider how location-based games may be used by the curatorial and educational departments. Nevertheless, interpretation of exhibitions and learning do occur when visitors are engaged in gameplay, and can be considered part of intellectual engagement of players with the museum. This means that I mention these outcomes if they appear, but do not strive for them during the design process, and as a consequence, did not specifically study them during data collection.

When it comes to studying the museum experiences, ethnographic methods are commonly used to observe, document, and analyse the ways visitors engage with and create meaning in museums, whether the focus is on the design of

exhibitions (Basu and Macdonald, 2007), on learning outcomes (J. H. Falk and Dierking, 2000), or understanding visitors better so museums can be adapted to their needs (Pekarik, 2007), as well as when studying the work culture within the museum (see S. Macdonald, 2002 as an example). Regarding engagement, quantitative surveys are often employed in order to uncover statistics regarding visitor numbers and other data such as age groups and socio-economical background, but surveys can also be used to compile other kinds of data, such as motivations and visiting habits (Black, 2005; 2012 draws on a lot of such data in order to understand engagement in museums; see also J. H. Falk and Dierking, 2012 for an overview of the types of experiences visitors have in museums). As mentioned before, statistical data does not adequately respond to this investigation's research questions, and data on motivations, visiting habits, and other qualitative questions can be collected during interviews. As such, ethnographic methods became my tool of choice to study gameplay experiences in museums.

Methodology: Player-Researcher

My own methodological approach to studying gameplay experiences in the specific context of museums adapts different elements from the methodologies referenced so far in this section. These methods support one another in presenting multiple perspectives of the same complex phenomenon. In order to respect the personal, subjective and experiential nature of gameplay, I opted to include both a first-person and a third-person examination of gameplay and the way it affects engagement with the museum. This decision was informed by the arguments of several game scholars, who assert that a full understanding of games, gameplay and game design can only be accomplished by playing the games one is studying. Espen Aarseth formulated a methodology for the study of gameplay which incorporated three perspectives: a study of the design, rules and mechanics of the game, by gaining access to the game developers; observation of other players engaging with the game; and playing the game ourselves as researchers, the most valuable method if combined with the other two (Aarseth, 2003). This combination of methods is employed to avoid a reductionist perspective through the loss of critical distance, and to improve the applicability of generalisations derived from qualitative data.

For a first-person examination of gameplay, I become a player-researcher, that is, I engage in critical gameplay and carry out an analysis of my own experience. The aim is to identify the game design choices that contributed to the gameplay experience and, in turn, how that gameplay affects my museum experience. Since the goal is to identify and analyse the results of game design strategies which I could then apply and test as a game designer, my analysis of gameplay is naturally geared towards the perspective of game design. Namely, while playing a game, I look for specific game design strategies and choices made by the creators, such as: Was the game built for solo players, or does it support multiple players? If so, in what ways, and how effective is it? What kind of technology do I need to play the game, and how easy is it to use? Does the game impact my museum experience? For example, does it help me navigate the museum space? Does it make me feel more focused, make me want to come back, draw my attention to content, or help me understand an exhibit better? If so, what design strategies contributed to that? The methods I used to study gameplay are summarised in Appendix A.1. Engaging in critical play, I study existing location-based games in museums as a researcher who is also a game player and designer, practicing autoethnography, documenting and analysing my own gameplay experiences, taking photographs and videos during games, analysing my motivations, emotions and engagement during and after playing, and critically reflecting upon them. As a player-researcher, I sought out game experiences that I identified as being potentially informative for the aims of this investigation. Past location-based games in museums that are relevant historically, conceptually or in terms of design, but which I have not personally played, and whose players I could not get direct access to, are referred to and examined, but not explored in-depth. Whenever possible, I play the games in more than one session of each game, both by myself and with others, documenting my experience through notes (see Appendix A.1.1 as an example), screenshots (see Appendix A.2.2) and photographs (see Appendix A.2.1), as well as observing other players and asking about their experiences (see Appendix A.3). The methods used to document my experiences range from handwritten notebooks, digital notes, photographs, screenshots and video. When available, I collect and photograph support materials for the games, such as the maps in *Raiders of the Lost Archive* (see Appendix A.2). These notes would be then transcribed into descriptions of the experience organised by game mechanic and

game design strategy, which were later incorporated into the various chapters of this thesis.

The complexities of assuming the position of player-researcher are manifold. At times, playing games as a researcher focused on the aforementioned questions interferes with how I would otherwise play as a regular participant: for example, in timed games such as *Raiders of the Lost Archive* or *Cambridge Codebreakers*, I was aware of the fact that I was not as effective because I was spending time taking notes and observing other players (see Appendix A.1.2). Moreover, playing the games with the intent of analysing game design strategies often interferes with a regular enjoyment of the game. I attempt to mitigate this issue by enlisting other players to participate in the game with me whenever possible and getting their perspective and opinions on the games. This interference and subsequent compromise between research and gameplay is necessary as part of the process of positioning myself as a player-researcher, distinct from a regular player or observant, and therefore in obtaining a more complete perspective on the games than would be possible if limiting myself to one role or the other.

To examine the case study experiences to which I contribute as part of the design process, I conduct research through design, documenting and analysing the design process, including screenshots, photographs and detailed observations, as well as interviews with the game designers and museum professionals involved. For the gameplay analysis of the resulting experiences, I observe and document the experiences of other players, as well as conduct interviews and focus group discussions with them in order to understand their actions and ways of engagement with the game and the museum. A semi-structured interview format was used in order to allow for the collection of rich qualitative data. Semi-structured interviews allow for additional questions to be posed in response to players' lines of thought and answers. Baseline questions included: what motivated players to take part in the game? Did they visit the museum specifically to play, or did they chance upon the game? How did they engage in gameplay? How did they interact with the museum content and space, and how did they interact with other players? Did they enjoy playing, and why? Did they learn anything new? And finally, did playing the game motivate them to come back to the museum in the future? These interviews gave me the opportunity to understand how players interpreted their own gameplay experience, and to

explore the nature of their engagement with the museum's space, stories, collection objects and other content. Taken together, the different perspectives on the same research questions allow a more complete understanding on the effect of using location-based games for engagement in museums.

Regarding the selection of case studies whose design I was not involved with, but which I deemed important enough to include as part of the historical research on location-based games in museums, and for the selection of current games for myself to engage with as a player, I followed the subsequent guidelines for inclusion.⁵ The first is that all the case studies included are from the context of public museums in the United Kingdom, with experiences in museums outside this region mentioned only when essential as examples. This decision follows the already mentioned highly context-dependent nature of location-based game design, which is inherent to those games and which becomes increasingly apparent throughout the investigation. A second criteria for inclusion regarded practical decisions in terms of resources and time. Being based in the United Kingdom, more specifically in England, it was easier for me to get access to and play games first-hand in the institutions closer to me. As such, although games in other locations are studied whenever possible, my main focus is on the national museums in Exeter, London and the surrounding areas, when it comes to the first-person analysis of my gameplay experience. Although every museum is unique, with its own work environment, historical background, resources, architecture, collections and stories, and therefore the games based on them can also be expected to be unique, the interaction and design principles behind them can be generalised, and then adapted by each institution. This idea permeates the entire thesis and the creation of the game design framework, which in turn includes advice on how to adopt these practices to the specific context of each museum.

Structure of the Thesis

The structure of this thesis reflects the nature of the investigation, which starts with theoretical research on games and the museum experience, and moves on

⁵ I played more experiences than the ones included in this thesis as case studies. Some, such as Blast Theory's *Operation Black Antler* (2016), which I studied extensively during my residency with them, were useful in not only informing practice, but also giving an insight into the process of creation of that experience. While *Operation Black Antler* (2016) is not included in this thesis (see Romualdo 2016 for a study of it), the interviews with Blast Theory are included as I reference them in this thesis.

to practical research with first-person analysis of specific experiences, as well as the design and development of practical case studies of the design of location-based games, which are then analysed regarding the gameplay experience they offer to visitors. This thesis includes several case studies, each focusing on a major component of the museum experience - the tour, the collection objects, and the exhibition galleries – incorporating them into location-based game design strategies and studying its effects on the visitor experience. This means structuring a museum tour so that it becomes a self-guided quest, completed alone or in collaboration with other players (chapter two); transforming objects in the museum's collection into game worlds, which can then be explored in conjunction with viewing the objects in the real-world (chapter three); and transforming the museum galleries into an immersive game board, in which players solve puzzles and compete against each other or the clock (chapter four). These strategies have overlapping characteristics, although they remain distinct in their aims, as well as in the choice and use of game elements and game mechanics. In each chapter, there are two main case studies: one looks at existing games, through a first-person critical perspective of gameplay, and the other looks at the design process, with myself as collaborator, and at the resulting gameplay through the perspective of other players.

To build the theoretical ground on which to base the thesis, **Chapter One: A Gameful World** establishes the concepts, key terms and definitions that inform the rest of the investigation. The chapter begins with an introduction to play and games, focusing particularly on what makes them motivational and enjoyable experiences, an overview of their current cultural and social importance, and how and why they have permeated contexts outside entertainment. I clarify what I refer to when I talk about location-based games and what their design process entails. I consider games that use physical spaces as part of their design, such as live-action roleplaying games, escape rooms, and pervasive games, as well as other types of location-based experiences with gameful characteristics, such as immersive theatre and live cinema, both in terms of design and gameplay experience. I then introduce the particular context of museums and the unique characteristics of the experiences they give to visitors, and how those can be enhanced by games, establishing the reasons why museums would want to

become more gameful. This analysis results in lessons and considerations that are applied and developed throughout the rest of the thesis.

This chapter is followed by the main body of the thesis, comprised of three chapters dedicated to case studies which illustrate different approaches to location-based game design in museums. The case study chapters follow the same basic structure: I start by identifying and analysing the components of the museum experience that are incorporated into game design in each chapter, and the game elements, mechanics and game design strategies that are developed to do that, and the reasons for those choices. In order to understand what the resulting experiences are and the possible effects specific game elements and mechanics can have on the visitor experience, I then study existing and past examples of games that use those elements and mechanics, with myself taking the critical stance of a player who is also a researcher. The examples selected are not meant to be an exhaustive overview of the field, nor does their selection mean they are the best possible examples. Instead, they are illustrative of the diversity of approaches, and studied in-depth in order to identify lessons, gaps and lines of enquiry that can be addressed in the design of practical studies to be developed, put into practice and studied within RAMM, with the participation of other players. The last section of each chapter is focused on the design process of the case studies, the development and implementation of that process in the context of RAMM, and an analysis of the resulting gameplay experience.

Chapter Two: The Quest and the Museum Tour is dedicated to analysing the use of location-based game design strategies to restructure the path that visitors take around the museum, which without games can be free and unguided, or constricted through the use of guided tours, audio-guides, mobile guides, and treasure hunts, among others. I propose that the visitor's tour can be transformed into a player's quest through the use of different design strategies.

The main finding in this chapter is that structuring a museum visit into the format of a quest, with specific starting and end points, as well as objectives along the way, gives players a greater sense of purpose to their visit, a feeling of mastery when completing challenges, and a deeper involvement with the content they subsequently engage with in the museum. I also find that these experiences attract to the museum new visitors who, before playing, were not interested in

visiting, but who were keen to participate in games, and afterwards express an interest in returning, a finding common to all case studies in this thesis.

To create a theoretical background against which to develop these strategies, I examine past experiences, such as *Ghostwriter* (Blast Theory, 2011), a gameful audio tour created by the artist group Blast Theory for RAMM, and the *Hidden Museum* (Aardman, 2016), a mobile app developed for the Bristol Museum & Art Gallery, which allowed visitors with hand-held digital devices to play location-specific games through the use of iBeacons, small Bluetooth devices that locate and help players navigate the museum building. As a critical researcher engaged in first-person gameplay analysis, I document and analyse my gameplay experience with *Treasure Hunters* (Aardman, 2018) at the Science Museum in London, focusing on the effects of challenges, directed exploration and virtual rewards on my engagement with the museum. Finally, I design and develop a location-based quest for RAMM, *The Great Exeter Garden Quest* (2016), based on an existing digital platform to which I apply the core mechanics of quest-based challenges and the exploration inherent to a player's physical journey. This experience, built in connection to the temporary exhibition *International Garden Photographer of the Year* at RAMM, took players on a self-guided journey around the city of Exeter, during which they were asked to complete challenges while discovering connections between the city and objects in the museum's collection.

Chapter Three: Game Worlds and the Museum Collection analyses the transformation of objects in a museum's collection into game worlds, which can then be played in as an accompaniment to experiences with the original object. My proposal is that doing this engages players in the core mechanic of exploration, which sends them on experiences of discovery and curiosity. This transformation can be done through the application of different technologies, including augmented and virtual reality technologies; however, I chose to focus instead on the use of *Minecraft* (Mojang, 2009) for the creation of game environments. *Minecraft* is a popular sandbox game which allows players to build custom-made environments that can be shared, explored and interacted with. By constructing these environments, often through collaboration with other players, and connecting them with the original objects, museums can offer visitors layered multimodal possibilities of engaging with artefacts in their collections, therefore creating bridges between the digital and physical sides of a museum's offerings.

While the use of games such as *Minecraft* and the creation of bespoke game worlds does not necessarily translate into the creation of location-based experiences, these can be made by connecting those worlds to real-world content in the museum, and by organising events which give players the opportunity of exploring these worlds inside the museum.

The main finding from this chapter is the confirmation of the effectiveness of games to pull into museums visitors who are primarily interested in games, getting them to interact with and learn about the museum and its contents as a side effect of gameplay. By structuring the museum visit into an event grounded in the exploration of a game world inspired by objects in the collection, players became more aware of the existence of those objects and showed express interest in learning more about them as part of the visit, which became a blend of in-game and in-gallery exploration and playful engagement. An additional finding from this chapter is the interest that the broader gaming culture – comprising, beyond the games themselves, famous players and creators of content about the games - can have for visitors who are primarily game players.

In order to study these experiences, I examined different *Minecraft*-based experiences created by cultural institutions. As a player, I critically engaged with and played the *Great Fire of London 1666* (2016 - 2017) *Minecraft* project at the Museum of London, a set of three interconnected game environments created with concepts and objects that could be found in the temporary exhibition at the museum they were built to complement. This characteristic, that is, using game environments as bridges to create experiences that are both digital and physical in nature, was further explored at RAMM, through the creation of *Minecraft at RAMM* (2017-2018), a set of different *Minecraft* versions of the city of Exeter based on objects in the museum's collection. Specifically, I focus on the transformation of a particular object, the Hedgeland Model of 17th Century Exeter, into a *Minecraft* environment, which can be explored and played with as part of multimodal activities set at the museum. The game environments were created in collaboration with professional *Minecraft* builders, who were commissioned by RAMM to build the environments according to design specifications agreed upon between me and the museum team and were an essential part of the events at the museum.

I found that events involving *Minecraft* at the museum are attractive to families with children who play the game in their own time, regardless of the theme and focus of the event, making this a valuable tool for motivating this segment of the population to visit the museum and engage with the specific objects involved in the activities. These children were already literate in playing and building their own creations inside the game, and the events built upon that literacy, with the added benefit of involving the rest of their families in their gaming activities. These groups felt motivated to visit the museum because of *Minecraft*, with families reporting the validation of the children's interests and their appreciation of the collections-related learning and engagement opportunities inherent in the activities.

Chapter Four: Environmental Puzzles and the Museum Space examines the transformation of a museum's physical space, specifically, the galleries that house its permanent exhibition, into a game board, in which players solve puzzles based on the collection and space. I propose that, through the use of the environment as part of gameplay, as well as the core mechanic of puzzle-solving, the galleries of a museum can be transformed into a space in which players perform a role within a story and complete challenges, while engaging with the space and the objects exhibited therein. The resulting experiences can take the form of live-action roleplaying games, alternate reality games, escape rooms, and other types of pervasive games, often mixing digital technologies with non-digital game elements.

I find that developing stories and puzzles that make use of museum space, not only as physical game boards, but as thematic inspiration, encourages players to see themselves as part of the museum environment, makes them more interested in exploring and learning how to navigate the space, gives them guidance regarding where to go and what to engage with, and promotes knowledge acquisition as a side effect of gameplay. In particular, engaging in puzzle-solving against other players or against the clock gives players a sense of accomplishment and mastery, which would be difficult to achieve in a non-gameful museum visit. While most players described these experience as fun, engaging, entertaining and highly motivating, they also reported that it hindered what they consider to be an integral part of the museum experience, which is learning. This happened due to the time constraints and the pressure to win the

game, which became the primary aim for players, as opposed to engaging with the artefacts for the sake of it. However, when asked about specific facts and information they had come across while playing, many recalled this with accuracy, suggesting that learning was occurring at a level that was more unconscious than in non-gameful museum visits. Moreover, the game design elements that were identified as limitations to learning, such as a time limit and puzzle difficulty, can be considered fundamental characteristics of what makes the game engaging and fun. Finally, and once again, the games attract to the museum new visitors who are game players, but these games also tend to attract regular visitors who report that they have visited a museum so often that they feel that the permanent exhibits no longer hold new interest for them. Location-based games which give them a role to play in a story and direct them to objects they might have overlooked are an efficient way to re-kindle these visitors' interest in the collections.

I study past examples of these experiences, such as *Capture the Museum* (Though Den and Splash & Ripple, 2013), a competitive smartphone-based game played at the National Museum of Scotland, *Art Heist* (Coney, 2010), an alternate reality game created by interactive theatre company Coney for the New Art Gallery Walsall, and *Mystery at Frankenstein's Lab* (Atomic Force Productions, 2018), created by Atomic Force Productions for the London Science Museum's festival dedicated to the centenary of the publication of Mary Shelley's novel. As a player, I examine my first-hand experience of *Raiders of the Lost Archive* (Fire Hazard Games, 2016 - ongoing), a series of thematic games created by Fire Hazard Games, set in the Victoria and Albert Museum and the British Museum in London, which blends entertainment, popular culture references and learning through the use of a digital gaming component and puzzles based on the artefacts that can be found in those museum's permanent exhibits. With RAMM, a different game design strategy was pursued in regards to environmental storytelling and puzzle-solving: instead of having a digital gaming platform, I studied the creation of an analogue gaming experience, by commissioning an escape room type of game that used the museum galleries as a game board. The resulting game, *The Rowley Riddle* (2018), created by Red House Mysteries, was a one-hour 'escape the museum' experience, in which the museum's galleries were transformed through the use of props and players were

engaged in a story inspired by the history of the museum, as well as the exhibitions and the building.

In **Chapter Five: A Location-Based Game Design Framework for Museums**, I bring together the findings from the previous chapters, identifying commonalities and divergences among them, tracing the evolution of my own practice and research, comparing the various game design strategies, elements and mechanics, as well as the results from each of them and the processes through which those results were obtained. In the interest of practicality and real-world application, I discuss lessons learned through the course of this investigation, in terms of limitations regarding technologies, resources, and other issues. Going back to the initial research question, I build up a framework of practical guidelines, lessons and strategies for creating location-based games in museums, restructuring the museum experience through the use of gameplay. This framework aims to be a starting point and to challenge museum professionals and game designers to collaborate in the creation of gameful museums.

Finally, in the **Conclusion**, I summarise my contributions to the fields of game studies and museum studies, and offer directions for future research. My contribution to the field of game studies includes the establishment of museums as spaces full of potential for gaming, the development of strategies to explore that potential, and the analysis of the effects of that development in the experiences that visitors have while engaging with the museums. This ties in with a broader development in game studies, in which games are being created to be more aware of and responsive to the physical places where they are played. On the side of museum studies, I reiterate the benefits of developing location-based games for museums, and end the chapter by proposing the concept of the gameful museum, which involves transforming museums using gameful structures as inspiration, providing diverse experiences which promote motivation, learning, playfulness, imagination, and engagement.

As an industry and a cultural form, digital games move rapidly, and that is also true for location-based games. This investigation and the case studies therein illustrate a dynamic process that is still occurring, and which in the course of these past three and a half years has seen the practice of developing different types of games for museums become more established. This has consolidated my belief in the importance of conducting this research, and doing it now, so that the

progress can be documented, studied, and shaped towards best practices. The research described in this thesis is responsive and adaptable to changing circumstances, with the challenges that come with conducting an investigation into an emerging field of practice. Given the rapid growth and evolution of the field, this thesis is also an attempt at documenting the current state of experiences being developed, but its main priority was to create a framework for practical application. I predict a future in which the developments that I studied and contributed to during the course of this investigation, namely, how museums become gameful and the growing importance of the physical context of where games are played, in terms of creating games that are designed to be played in specific locations, become increasingly important. I conclude this thesis by engaging in this forward-looking exercise, identifying opportunities for museums and games in terms of further research and future developments in their respective industries.

Chapter One: A Gameful World

The development of an interdisciplinary investigation, especially one that aims to work in and contribute to an emerging field as is the case of the design of location-based games for museums, requires the establishment of theoretical foundations upon which can be built a conceptual framework that supports the practical side of research. To that end, in this chapter, I outline the key terms, concepts and definitions that inform the rest of the investigation and which I use throughout the thesis. This chapter establishes a common language, since many of the terms used - such as play, games, location-based, gameful, motivation and engagement - can be ambiguous, or have different meanings when used in other fields and by other authors. This chapter also helps to demonstrate why this investigation is timely and important, by establishing the rising popularity of location-based games and related experiences and by explaining how they can encourage motivation and engagement in museums.

The first section is an introduction to play and games, their characteristics, importance and points of divergence, to account for the fact that in this investigation I focus on games instead of play. I also look at the permeation of games in culture and society, from the rise in popularity of videogames, to the increasing pervasiveness of smartphones and other portable, personal, multi-purpose digital technologies which can be used for gaming. The use of games for purposes other than entertainment, and the emergence of location-based games and other gameful experiences which combine digital and physical environments with game elements and mechanics, are also considered. Most importantly, this section establishes foundational concepts and language to be used throughout the thesis, including what it means to be gameful, which are the elements that constitute games, the mechanics of gameplay, and how these characteristics can be leveraged by game designers to encourage certain types of engagement from players.

In the second section, I establish definitions and analyse the characteristics of pervasive games, location-based games and other gameful experiences. I study past and current examples of these practices and outline the most important lessons regarding game design and gameplay, focusing on the elements, mechanics and strategies that can be found in location-based games, and which I develop and test in this investigation's case studies.

In the last section, I turn my focus to museums as spaces for gameplay. The subsequent choice of which location-based game design strategies to adopt to the context of museums, and how to apply them to the visitor experience, is informed by an analysis of their current role as institutions for collecting, preserving and exhibiting objects, as well as providing learning and entertainment opportunities for their communities. These aims require engagement from visitors, and encouraging that engagement becomes the priority for the games developed as case studies. I identify characteristics of the museum and the visitor experience that should be incorporated into location-based games, and which are put into practice in this investigation's case studies.

Play and Games: Establishing Concepts

Before engaging in the design of location-based games and the analysis of gameplay, it is important to understand the foundational concepts of play and games. The aim is not to arrive at exact definitions, but to establish the language used in this thesis and recognise how these concepts can be applied in the context of museums. I look into how games and gameful experiences have permeated other forms of entertainment and experiences. These concepts have been studied in different fields, from biology and psychology, to philosophy, human-computer interaction and performance, among others. For the purposes of this investigation, I focus on perspectives that help illuminate the experiential side of gameplay and the process of designing games, as well as how games work in relation to the physical locations they are played in.

Play is a naturally occurring biological process and a core aspect of mental and physical development, particularly during the early stages of development, although its benefits can be felt throughout adult life as well (S. Brown and Vaughan, 2009; Verghese et al., 2003; Winnicott, 2005 [1971]). The concept of play can be defined as both an activity - to play - and a mind set or attitude - having playfulness, or being playful (Sicart, 2014, p. 22; Stenros, 2014, p. 204). Johan Huizinga, in his influential 1938 book *Homo Ludens: A Study of the Play Element in Culture*, describes play as 'a free activity standing quite consciously outside "ordinary" life' (Huizinga, 1980 [1938]), denominating this separation 'the magic circle of play', to describe the distance from the rules of the game to the rest of the world, making play a safe environment in which to experiment. Within the magic circle of play, behaviours and objects are freed from their everyday

meanings and rules. This concept of the magic circle, and its implied separation from the real-world, while originating in the study of play, has been applied to several contexts that involve play, including theatre and games (Salen and Zimmerman, 2003). Huizinga acknowledged the difficulty in defining play, as it is 'not susceptible of exact definition either logically, biologically, or aesthetically' (Huizinga, 1980 [1938]), a position echoed in later years by other authors, including game designer Mary Flanagan who describes play as 'a notoriously difficult concept to define; it is a culturally and socially specific idea,' despite being 'recognized as one of the most fundamental aspects of the human condition' and 'an integral and vital part of mental development and learning' (Flanagan, 2009, p. 4). However, it is possible to recognize common points among most definitions: play is voluntary and absorbing, does not typically have a clear purpose, and its rules are separate from the rules of reality.

Understanding play is important in the context of this investigation as it is the word used to describe the activity that players engage in during a game. However, even though the verb play is used to describe what we do with games, engaging in play is not the same as engaging in a game. Roger Caillois established the difference between *paidia*, free play, and *ludus*, formal games (Caillois, 2001 [1958]). It is possible to engage in a game without feeling playful, and to engage in play without the structure of games. Compared to games, play is less structured, more open, and less restricted. Since the concepts overlap, the relationship between play and games is perhaps best described as games being at the end of a continuum of increasing structure in playful activities, which happens when playfulness is socially shared and codified (Stenros, 2014, p. 201). Where play is free, games have restrictions set by rules, but within the limited actions permitted they enable players to creatively adapt and choose their own strategies (Getsy, 2011, p. xiii). Toys and playgrounds can be distinguished from games through the identification of certain gameful properties, also called game elements, such as rules, goals, and scores, although the distinction is not always clear. In order to distinguish between using play and games as tools for engagement, I use the term gameplay to distinguish the experience provided by games from free play. While free play has been used extensively to create engagement in museums (Beale, 2011) and may be desirable in certain situations, the focus of this investigation is the engagement derived from the

structure provided by games, specifically through the types of gameplay that are possible using real-world locations.

As for games, their definition has occupied authors from different fields for many years, and the results are dependent on the perspectives they originate from. In this investigation, I use the word game to refer to a broad category of objects and the gameplay experiences they offer, which includes playground games, table top and board games, as well as videogames, mixed reality games, pervasive and location-based games. The aim of using a broad categorisation is to be able to include borderline cases, rather than adopt a strict stance and risk leaving out experiences which may be of interest to the investigation. It is useful to have a notion of what the word game refers to, especially when used by game designers; however, more important than how a game can be defined, for this investigation, is an analysis of the elements and mechanics that make up a game, and how players experience gameplay. Common elements can be identified across most definitions, such as structuring play through rules, offering an interactive experience, and creating conflict between the player and the game system, although there are considerable differences regarding most other characteristics.

Several game designers have attempted to create a definition of games that can be applied to most objects and experiences commonly identified as such. An influential definition was devised by game designers Katie Salen and Eric Zimmerman, who define a game as 'a system in which players engage in an artificial conflict, defined by rules, that results in a quantifiable outcome' (Salen and Zimmerman, 2003, p. 93). Jane McGonigal lists rules as one of the four core defining elements of games, together with goals, a feedback system, and voluntary participation (McGonigal, 2012, p. 21). Rules act as fixed limitations on players' actions towards a goal, and the feedback system lets players know how effective their actions are in achieving that goal. With a nod towards Huizinga's definition of play as voluntary, McGonigal implies that a game has to incorporate not only play, but also the freedom to enter and leave at will, ensuring that even if the activities that the game encourages are designed to be 'intentionally stressful and challenging work,' the game will still be 'experienced as a safe and pleasurable activity' (McGonigal, 2012, p. 21). Jesper Juul reviews definitions by several other authors, including those by Huizinga, Caillois, Bernard Suits, E.M. Avedon and Brian Sutton-Smith, Chris Crawford, David Kelley, and Salen and

Zimmerman, in order to identify common points. Following this review, he proposes a definition based on six core features. This definition, while not applicable to every artefact that can be identified as a game, encapsulates important characteristics and has the advantage of being applicable to games in different media and formats:

A game is a rule-based formal system with a variable and quantifiable outcome, where different outcomes are assigned different values, the player exerts effort in order to influence the outcome, the player feels attached to the outcome, and the consequences of the activity are optional and negotiable. (Juul, 2003)

Borderline cases, at the edges of these definitions, are common. For example, sandbox videogames, such as *Minecraft* (Mojang, 2009), and live-action roleplaying games, in which players physically become their characters and engage in open-ended gameplay, do not have a quantifiable outcome, yet are still referred to as games. A way to accommodate these borderline cases is by looking at the characteristics that are common to artefacts and experiences referred to as games. This perspective is based on Ludwig Wittgenstein's concept of 'family resemblances', which describes how a definition can be based on similarities that are not necessarily shared by all the objects that definition applies to, singling out games as an example of a 'concept with blurred edges' (Wittgenstein, 1969 [1953], p. 34). This way, we do not exclude from the discussion objects that can be found in 'liminal spaces' (Salen and Zimmerman, 2003, p. 95). The consequence is that whether an experience is considered a game is often determined by individual perception of the presence and importance of game elements and mechanics, rather than by a clear-cut categorisation (Seaborn and Fels, 2015, p. 16). By themselves, none of these game elements and mechanics, which I analyse later in this chapter and apply throughout the thesis, can be said to unequivocally turn an activity into a game, but they contribute to making it more gameful.

When an experience has characteristics that approximate it to a game, while not exactly being recognisable as a game, it can be called game-like, or gameful (Elias, Garfield, and Gutschera, 2012, p. 7). In my investigation, I use the word game to describe experiences that were deliberately created to be experienced as games, whereas gameful is used to refer to experiences that, while not being purposefully created as games, incorporate some of the key structural and

aesthetic elements of games (McGonigal, 2014). The word gameful is used here in the same sense that the adjectives cinematic, photographic, and literary are commonly used, although the word gameful has yet to enter into a dictionary at the time of this writing. The practice of describing an object through its proximity to a different medium reflects the popularization and spread of that medium within culture. The phenomenon of the characteristics of media seeping into and colonizing the cultural landscape was described by Marshall McLuhan in his influential book *Understanding Media*, where he argued that, as technologies and tools start to colonize the cultural landscape they not only become ubiquitous, but also re-shape that landscape (McLuhan, 2001 [1964], p. 8). Thus, cultural objects and systems begin to adopt characteristics of different media, and humans themselves may be influenced by those changes.⁶ In this case, being gameful is not the same as being playful: while creativity, curiosity and fun are characteristics of both, being gameful means having purpose, creatively engaging with the limitations imposed by rules, feeling highly motivated to reach goals, being open to acquiring new skills and learning how to incorporate them towards goals, and feeling confident that one's capabilities are enough to overcome obstacles to reach the endgame, or that this is at least attainable if one fails and tries again, perseveres and becomes better (McGonigal, 2014). Against a background of increasing influence of games in the larger cultural landscape, as described later in this section, this investigation contributes to scholarship by analysing what becoming gameful means in terms of experiences in museums.

Towards a Gameful World: The Permeation of Games into Other Contexts

One of the reasons why this investigation is timely and relevant is the current and growing importance of videogames, location-based games, and gameful experiences in culture, in the United Kingdom and beyond. In the last three decades, videogames have gradually become one of the most popular and ubiquitous media in the entertainment industry (Fuchs, 2015, p. 7), as well as the focus of considerable academic study, starting in the early 2000s with the establishment of 'game studies, game exhibits, game museums, and game

⁶ This phenomenon has been described before in regards to media and technologies as diverse as maps, clocks, books, television, and the internet. As an example, in his popular science book *The Shallows: What the Internet is Doing to Our Brains*, Nicholas Carr traces the influence of these and other media and technologies on human culture and behaviour, with a focus on how the daily use of the internet and hypertext is shaping the way we communicate, write, read, and think (N. Carr, 2011 [2010]).

canons [...] institutionalizing games as objects of cultural worth' (Deterding, 2014a, p. 32). Videogame players are becoming more numerous, and their demographics have become more diverse (ESA, 2015; Seaborn and Fels, 2015). The impact of games on culture goes beyond entertainment, with the professionalization of online gaming, in the form of YouTube videos or streaming, the emergence of illegal 'gold farming' practices, as well as design and thinking inspired by games appearing in various other contexts. Game elements such as points, goals and reward structures now frame various personal experiences, media, commerce, workplaces, education, and artistic practices (Flanagan, 2014, p. 249). Game engines and technologies are commonly used by industries outside games, such as architecture, animation and design.

The economic importance of games as an industry is increasing, while the social stigma that used to be associated with adult gameplay is diminishing (Stenros, Montola, and Mäyrä, 2009, p. 266). The familiarity with, and ability to play and design games, has been described as a fundamental literacy to the creation and understanding of meaning in the new century (Gee, 2007 [2003]; McGonigal, 2012; E. Zimmerman, 2014). This trend of an increasing influence of game elements in culture has been described as the ludification of culture (Raessens, 2006), the emergence of a ludic society (Stenros, Montola, and Mäyrä, 2007), the growing pervasiveness of a ludic language (Flanagan, 2014), the emergence of a ludic age or century (E. Zimmerman, 2014), or, more broadly, a gameful world (Walz and Deterding, 2014).

The ludification of culture, at this particular moment in time, can be connected to the development of increasingly sophisticated, portable, accessible, and ubiquitous digital technologies suitable for gaming, such as smartphones, tablets, and portable consoles. The use of these technologies potentially gives rise to environments that merge physical and digital environments, becoming what can be described as mixed reality environments and hybrid ecologies made up of these environments (Benford and Giannachi, 2011; Crabtree and Rodden, 2008). Digital technologies and games form a productive match, due to the participatory, processual, interactional, and systematic nature of videogames themselves: '[w]hen information is put at play, gamelike experiences replace linear media. [...] We live in a world of systems. [...] In such a systemic society, games make a natural fit' (E. Zimmerman, 2014, p. 20). No longer confined to the home or

dedicated arcade spaces, videogames are now accessed and played on the go, on smartphones, tablets, and other portable devices, during work, leisure, socialization, and commuting time. The distribution of games has also evolved, from physical copies to online platforms that offer games as a service (Deterding, 2014a, p. 23). Processing power, data storage, internet access and portable technologies have become less expensive and more accessible to a wider range of people, increasing the audience for games that make use of these technologies. Moreover, in an information or experience economy (Pine II and Gilmore, 2011 [1999]), more value is placed on the experiential side of products, as opposed to the physical ownership of products.

While these trends – the increasing popularity of videogames, the ubiquity and sophistication of mobile personal technologies, and the ludification of culture in an experience economy - have been identified by several authors, their consequences in different parts of culture and society are still being studied and documented, and their possible consequences mapped. This influence can also be identified in museums, which have started in recent years to experiment with different types of games to diversify and improve the experiences they offer. Throughout this thesis, I analyse examples of these experiences. I also design, implement and critique the results of case studies, contributing to what I call a gameful turn for these institutions, the effects of that phenomenon, and, above all, how game design can be deployed to create location-based experiences that harness the positive effects of that gameful turn.

Games are most commonly associated with entertainment, but they have been developed and used in other contexts throughout history, including in military training, from China in 475 B.C. to the United States of America starting from the Cold War years (Deterding, 2014a; Walz and Deterding, 2014), in art movements such as the Situationists (Alfrink, 2014), in marketing, production and employee engagement (Mollick and Werbach, 2014), politics and social change, or teaching and learning (Ramirez and Squire, 2014). While this instrumentalisation is not a recent development, with the advent of videogames and the related developments mentioned earlier, the dissemination of ideas originating from games to other areas of activity, including business, work, marketing, and education, took a more visible form in the past two decades. Fully-fledged games whose primary purpose is something other than entertainment are denominated

serious games (Deterding, 2014a), whereas the permeation of game elements into marketing and education, which initially materialised in points, goals and reward schemes, began to emerge in the late 2000s, into the concept of gamification, which describes the reach of games, game design, and game thinking into everyday life.

Gamification has been defined as ‘the use of game elements in a non-game context’ (Deterding, Dixon, Khaled, and Nacke, 2011, p. 2), the permeation of society with methods, values, characteristics and elements from games (Fuchs, 2014), the ‘process of enhancing a service with affordances for gameful experiences in order to support user’s overall value creation’ (Huotari and Hamari, 2012, p. 19), as well as the ‘creation or use of a game for any non-entertainment context and/or goal, and the transformation of an existing system into a game’ (Seaborn and Fels, 2015, p. 17). The term was first documented online in November 2008, attributed to authors Clay Shirky and Bret Terrill, and its use became widespread after 2010 (Deterding, 2014a, p. 31). The aim of gamifying is to take inspiration from games and game design on what makes a game engaging, and to use those lessons in order to encourage motivation, engagement, enjoyment, and learning in different contexts, such as health, business, marketing, education, and many others. Engagement, in gamification, is used to refer to how much players use the gamified application, looking at, for example, how many times they use it and for how long and to what extent their behaviours are influenced by it, which can be measured by observing their actions. The resulting experiences become gameful, resembling and sharing characteristics with games, while not becoming full-fledged games in their own right.

Gamification is used for different ends, from promoting health and wellbeing, as seen in *SuperBetter* (Jane McGonigal, 2012) and *Fitocracy* (Richard Talens and Brian Wang, 2010), to encouraging productivity, as with *Chore Wars* (Kevan Davis, 2007) and *Habitica* (HabitRPG Inc, 2013). *Nike+ Fuelband* is another example of a gamified app for self-improvement and marketing (see Ruffino, 2018 for a thorough analysis of this app). The *Just Press Play* project is a game layer added to the university curricula at the Rochester Institute for Technology (Ramirez and Squire, 2014), whereas *Quest to Learn* is a school that has been restructured entirely as a game (Salen, Torres, Wolozin, Rufo-Teppe, and

Shapiro, 2011). Serious games have been created for many different ends, from involving the public in scientific research, such as *Foldit* (University of Washington, Center for Game Science, Department of Biochemistry, 2008), to creating understanding and empathy with human beings in dire situations, such as *Darfur is Dying* (Susana Ruiz, 2006), to tackling world-scale challenges, as was the case of alternate-reality game *World Without Oil* (Ken Eklund, 2007). Some of these experiences have taken the form of location-based games, examples of which I explore later in this chapter. These examples, chosen among many other possibilities for the sake of showing a broad view of the field, show the breadth of application of games to non-game contexts, and the diversity that the resulting experiences can have.

Gamification can also be used as an umbrella category to describe related concepts, such as gameful design and serious games (Walz and Deterding, 2014). Recently, the term gameful design has emerged to refer to the process of constructing gameful experiences from the ground up, as opposed to more traditional gamifying, or adding elements to, an existing experience. Gamification, serious games and gameful design are topics of significant academic interest (see Hamari, Koivisto, and Sarsa, 2014; Seaborn and Fels, 2015 for comprehensive surveys), and an overview of these fields is not possible or necessary for the purposes of this investigation.⁷ The most important takeaway for this thesis is that games and game design have been identified as useful tools for the promotion of engagement and motivation in contexts outside of entertainment, making those contexts increasingly gameful and opening the way for the same to be done in museums.

The practice of applying games for purposes other than entertainment is controversial. Some authors look at the practice favourably: Jane McGonigal is a vocal supporter of the power of using games and engaging players for social change and proponent of the ludification of culture (McGonigal, 2012). On the other hand, game designer Ian Bogost states that attempts at instrumentalising games ignore what makes them valuable and interesting, namely the fact that they are fun because they give players a structure within whose limits they can play (Bogost, 2016). Instead, gamification decontextualizes game elements and

⁷ Nevertheless, as part of this investigation, I have conducted significant research into these topics, and whenever relevant, I refer to these sources throughout the text.

applies them in isolation, attempting to harness the motivational nature of games by disguising marketing efforts, so that players' behaviours are being manipulated without them being aware of it (Bogost, 2014). The ethical implications of such practices led the author to propose renaming gamification as 'exploitationware' (Bogost, 2011). As an alternative, he proposes that we should 'play anything', that is, exercise our creativity and find fun in rules and limitations in all kinds of experiences (Bogost, 2016, p. 140). Game designer Margaret Robertson echoes this concern, asserting that gamification takes that which is less important in games, the scoring and reward system, including points, badges, and levels, and graft it onto a non-game context, a practice which she has referred to as 'pointsification' (Robertson, 2010).

Gamification can also be linked to another development: increasingly, the various facets of our lives are being tracked, recorded, and analysed by visible and invisible sensors and other technologies, and often by ourselves (Walz and Deterding, 2014, p. 273). This quantification of the self is a potentially problematic movement that draws on technology and feedback mechanisms from games to promote health, but which does so through normalisation and self-governance (Fuchs, Fizek, Ruffino, and Schrape, 2014; Whitson, 2014, p. 339). One way to engage in this practice, while keeping the focus away from quantification and on engagement through gameplay, is to engage in gameful design, as mentioned before. This can be done by reducing the emphasis on points, levels, goals and achievements, and instead emphasising motivation and engagement through gameplay. Other alternatives exist. Scott Nicholson proposes a more positive practice of gamification for museums, described as meaningful gamification, in which game elements are used to create a learning space which brings to the fore the characteristics of the underlying non-game context that are personally relevant to the player (Nicholson, 2012a).

My position as a researcher involved in game design leans toward a positive perspective on the practice of translating games into other domains, and infusing experiences with game elements, keeping in mind that these elements are not a panacea for engagement and interpretation, and do not necessarily work in every context and for every purpose. Instead, I began this investigation believing that games present museums with another tool to be added to their repertoire, and which, as the case studies in this investigation suggest, work to create

engagement in certain ways. As detailed in the introduction to this thesis, this favourable position influenced the decision to embark on this investigation, while maintaining a critical perspective and focusing on the observable results of the real-world application of these practices in museums.

From the beginning, I made the decision to not engage in gamification, as marketing was not the primary aim for creating these experiences, and not to create serious games whose primary aim was to promote learning in museums. Quantification of actions and choices, and assigning points to what visitors do, is not an adequate way to describe or study the museum experience as it does not reflect the quality and nature of what visitors do. Moreover, the objective of the games was not learning. Instead, the focus is on motivation and engagement, encouraging a playful mind set by structuring the museum experience into a game, with the aim of developing location-based games that encourage different types of engagement for visitors within the physical space of museums. In the early stages of this investigation, I used the term *gameful design* to describe the practice I was engaged in while designing the case studies; however, it later became apparent that the aim for which a game is created is less important than the process of its design and the gameplay experience it affords. The resulting experiences can be considered examples of a specific subset of games which incorporate the rules, stories and characteristics of the physical locations where they are played. These are referred to as *pervasive games*, and within that broad category, this thesis focuses on location-based games. Therefore, the practice I engage in is game design, more specifically location-based game design, and the resulting experiences are location-based games with the aim of creating engagement during a museum experience.

In the next section, I identify game elements, game mechanics, and gameplay effects related to motivation, both to continue to establish the language used throughout the case studies chapters, and to, later in this chapter, identify possibilities to use them for developing location-based games for museums.

Building a Game: Elements, Mechanics, Gameplay and Game Design

As explained earlier in this chapter, a game is composed of several elements, a generic term given to the basic constituent parts of games, which can also be found outside of games, but which together contribute to making an interactive

system gameful. Game elements encourage and allow players, the active agents in the system, to engage in certain activities, giving rise to the game mechanics which can be defined as ‘the various actions, behaviors and control mechanisms afforded to the player within a game context’ (Hunicke, LeBlanc, and Zubek, 2004, p. 3), or the result of the player’s productive engagement with the rules within the specific context of the game system (Flanagan, 2014, p. 266). Game mechanics can be described by the actions they imply from players, such as exploring, collecting, performing, puzzle-solving, shooting, competing, cooperating, learning, or roleplaying. When they do this, the game system responds to their actions and feeds the consequences back to players, and within this feedback loop, gameplay emerges. Gameplay is the term used to refer to the players’ experience while playing, and it includes their actions, choices, and the consequences of those choices as they are fed back to them by the game system, as well as the emotional, cognitive and psychological aspects of that experience. Similar to the definition of what constitutes a game, the distinction between game elements and game mechanics, and between game mechanics and gameplay effects, is not clear cut. In this section, I introduce game elements, mechanics and gameplay, drawing on research regarding motivation and engagement, with the purpose of understanding how the experience of gameplay is affected by game design strategies and choices. The aim of this section is to identify the game elements that are most useful for the design of location-based games, and which will be used, and their effects analysed in the case studies.

Different authors have created different lists and typologies of game elements and game mechanics, creating an eclectic but potentially confusing pool of resources for game designers to draw upon. To give some internal logic and organization, the ensuing exploration of game elements, mechanics and gameplay follows an order of the particular to the general. I draw on and develop from lists made by several authors, focusing on those compiled and described by game designers (Björk and Holopainen, 2006; Carroll, 2014; Costikyan, 2006 [1994]; Cruz, Hanus, and Fox, 2016; Dovey and Kennedy, 2006; Egenfeldt-Nielsen, Smith, and Tosca, 2009; Elias et al., 2012; Fernández-Vara, 2015; Flanagan, 2009; Hjorth, 2011; Howard, 2008; Hunicke et al., 2004; Nitsche, 2008; Perron and Wolf, 2009; Raessens and Goldstein, 2005; Salen and Zimmerman, 2003, 2006; Wolf, 2001; Wolf and Perron, 2003) and researchers of gamification

and gameful experiences (Deterding, 2014b; Deterding, Björk, Nacke, Dixon, and Lawley, 2013; Deterding et al., 2011; Dixon, 2011; Fuchs, 2015; Fuchs et al., 2014; Hamari et al., 2014; Huotari and Hamari, 2012; Kapp, Blair, and Mesch, 2014; Linehan, Kirman, and Roche, 2014; Nicholson, 2012a, 2012b; Rigby, 2014; Seaborn and Fels, 2015). I start by describing the formal elements that can be identified in games, such as rules, goals, points, badges, and levels, followed by experiential and social elements which translate into game mechanics, including competition, cooperation, roleplaying, puzzle-solving and exploration, ending with a study of gameplay and how games motivate players to keep playing. These elements and mechanics can be used by game designers to create specific configurations of gameplay, which translates into different experiences for players. An understanding of game elements and mechanics, and the effects they have on the gameplay experience, informs the choice of game design strategies to be used in the case studies. This section is an introduction, with more detail given on each of the game elements, mechanics and gameplay choices in the relevant case study chapter.

The first element to consider when designing a game is rules, which are fundamental to games: without them, the activity is considered free play, instead of a game. Rules tell the players what they can and cannot do within the game world, are explicit and unambiguous, shared by all players, fixed, binding, and repeatable (Salen and Zimmerman, 2003, pp. 122-123). Rules limit and structure play, but within that structure, players are free to creatively engage as they see fit. They limit the freedom of players, but that is not necessarily a negative characteristic: by removing ambiguities and artificially restricting behaviour, while still allowing for free play within the structure created by those restrictions, games have the potential to give rise to meaningful choices, leading to the creation of new interpretations. Rules specify how players can achieve goals, the quantifiable outcomes or winning conditions for the game. The importance of goals has been demonstrated through their inclusion in most definitions of games. Salen and Zimmerman go as far as saying that 'without a clear goal, meaningful game play is not possible; if players cannot judge how their actions are bringing them closer to or farther away from winning the game, they cannot properly understand the significance of their actions' (Salen and Zimmerman, 2003, p. 258). Goals do not necessarily mean that all games exhibit winning and losing

conditions; in sandbox and simulation games such as *Minecraft* (Mojang, 2009) goals can take the form of scores or tasks to be completed by players, or the game may let players decide for themselves the goals they want to pursue.

A game system gives players feedback whenever they make a choice that causes a change in the system, which in turn determines an outcome that is communicated back to the player. Feedback in a game can take many forms. It can be transmitted to the player in the form of sounds, images on the screen, or even haptic interaction, as is the case of vibrating console controllers. More commonly, feedback about the player's performance within a game takes the form of specific elements built into the game itself, such as points, achievements, or badges. Points quantify the players' actions within the game, indicating how they are progressing towards the goals. In many games, players receive experience points, which allow them to progress through levels, reflecting the growth and development of the playable characters and, by extension, the players themselves, signalling not only their progression but also their increased mastery of how the game works. Players are given challenges to complete, which are related to the game mechanics, and which allow them to gain points, complete levels, and progress through the game. For example, these may take the form of puzzles, self-contained challenges that require certain skills to be solved. Solving puzzles require players to have or acquire skills and information, and if they provide an adequate challenge they give players a sense of satisfaction and pride from having been successful in applying their skills. Players may also earn achievements, which signal the completion of an activity within the game (Ramirez and Squire, 2014, p. 635) and often take the form of badges that are awarded to them as a visible record of that accomplishment. Rewards that players receive after completing challenges may also include items, new skills, or access to more content within the game.

Other design considerations related to the basic constituent parts of the game include the technologies used to make and play the game. Videogames are by nature highly interactive and responsive. Interactivity implies that the system gives players the possibility of making meaningful choices, which in turn affect the game in some way. The way that the players' choices are communicated to the game system is highly dependent on the game technology, which can range from personal computers, to smartphones, consoles, virtual or mixed reality,

among other possibilities. In turn, these technologies determine the interface, which is 'a junction point between input and output, hardware and software, and the player and the material game itself, and the portal through which player activity occurs' (Wolf and Perron, 2003, p. 15). It includes not just the screen and all the game tokens it shows, including points, badges, graphical representations, and sounds, but also all the other elements that the game system uses to create feedback with the player, including physical input and output devices.

Finally, an important part of a game is the story that it tells. Games are an increasingly significant storytelling medium which gives agency to the player (Murray, 2016 [1997]), although not all games focus on telling stories (E. Zimmerman, 2014). A game's story can be told in different ways: it may emerge from the player's actions and choices, in text, cinematics and cut scenes, or through clues in the environment, a technique described as environmental storytelling. According to Juul, the ways that the game constrains and guides player actions towards goals give rise to two kinds of games: games of progression, such as most role-playing games, in which players have to follow certain scripted steps in a fixed order, and games of emergence, such as sandbox or simulation games, which allow players to dynamically influence the course of the game through their behaviours (Juul, 2005). Progression and emergence can be considered a continuum, with most games positioned somewhere between those extremes. Challenges that are given as part of a story can take the form of quests, a series of tasks to be completed and that take the player on a journey towards a goal. Moreover, stories often imply the existence of characters, which players may take control of as part of gameplay.

Game mechanics, as mentioned before, are the combination of rules and elements that allow certain types of interaction between players and the game system and are described with the actions they require from players, including exploration, discovery, choice, movement, aim, collecting, performing, puzzle-solving, competing, cooperating, learning, and roleplaying. Besides affecting gameplay, a game's core mechanic helps categorise games into different genres. The concept of genre is fluid and imprecise in any medium; in games, genre labels are widely used in and outside academia, even though they follow a multitude of criteria that often contradict or overlap (Arsenault, 2009, 149). In terms of themes, they can be classified according to derivations from literary and

film genres, such as science fiction, fantasy, crime, horror, among others. When it comes to interface, videogames are usually classified according to the way they position players in relation to the game world, meaning that they can be first-person, third person, or so-called 'god' games (Arsenault, 2009, 155). However, from a game studies perspective, the core game mechanics and the resulting gameplay are the most important factors. For example, they can be categorised as adventure, action strategy, role-playing, or shooting games among others, or combine elements from more than one genre. There are also types of games which exist on the fringe of traditional definitions of videogames, such as sandbox, non-linear games such as *Minecraft* (Mojang, 2009). These core game mechanics and genres have elements and characteristics that can be used to create experiences in different contexts.

Gameplay is the experience that takes place as a player engages with the rules and elements of a game, making choices and interacting with the game system. It is experiential rather than interpretive (Dovey and Kennedy, 2006, p. 146). This personal experience emerges from a complex mix of emotional, intellectual, and physical engagement between the player and the game. Engagement is what occurs when a connection is established between an individual and stimuli or activity, and is characterised by that individual's attention and interest, and the actions that follow (Rigby, 2014). In practice, what is meant by engagement is specific to the context in which gameplay occurs. In this section, I introduce gameplay effects, such as motivation, agency, flow, learning, immersion, and fun. Later in this chapter, I explain what this means in the context of museums. A game designer does not directly design gameplay, only the rules and context in which it occurs, and so can encourage certain behaviours but cannot guarantee them. Knowing the effects that games can have on players is useful when designing a plan to encourage certain types of behaviours, as is the case when creating experiences for museums. Their effectiveness is evaluated in the case study chapters.

One of the most important effects that games offer to players, and which encourages them to initiate and sustain gameplay, is motivation. According to psychology theorists Richard Ryan and Edward L. Deci, whose work is referenced by several authors regarding gamification (Aparicio, Gutiérrez Vela, González Sánchez, and Isla Montes, 2012; Hamari et al., 2014; Nicholson,

2012a; Rigby, 2014; Seaborn and Fels, 2015), motivation is feeling an impetus to do something, and can be intrinsic or extrinsic (Ryan and Deci, 2000). Intrinsic motivation is the energy to pursue an activity purely for its own sake, as opposed to requiring it to achieve an external goal, whereas extrinsic motivation is the energy to pursue an activity for its instrumental value as opposed to for its own sake (Rigby, 2014, pp. 125 - 126). While intrinsic motivation brings out a sense of autonomy in individuals, and has been demonstrated to lead to more sustained and long-term engagement than outside motivation (Ryan and Deci, 2000), extrinsic goals should not be dismissed, as they can be internalised by feelings of relatedness, or wanting to belong, as well as feelings of competence, if someone feels they understand an extrinsic goal and have the skills required to succeed at it (ibid). According to these authors and their self-determination theory, the three basic psychological needs and powerful sources of motivation are: competence or mastery, the need to feel effective, skilful and successful; autonomy, the need to feel like we determine our own path and are free to choose and exert control; and relatedness, the need to feel supported and accepted by others (Ryan and Deci, 2000). These three sources of motivation are useful guidelines for the design of engaging games and are part of the case studies in this thesis and the resulting design framework.

Competency and mastery are encouraged by games, as they include some form of challenge, skill acquisition and the application of those skills. Challenges in games are usually presented in a scaffolded way; that is, easy in the beginning and becoming progressively more difficult as players develop their skills. Salen and Zimmerman describe the best games as 'simple to learn but difficult to master, providing an appropriate degree of challenge for beginners and advanced players alike' (Salen and Zimmerman, 2003, p. 351). Moreover, many games offer players a choice of tailoring the gameplay difficulty to their skill levels before starting the game, or the choice to engage in optional content according to the level of challenge they wish to tackle. Through immediate feedback, players know the effects of their actions on the game world and are able to learn, adjust their behaviours accordingly, and improve their skills and knowledge. Often, games stimulate learning as an outcome of working towards a game goal, such as when players learn about past civilizations while playing historical simulation games like the *Europa Universalis* series (Paradox Development Studio, 2001-

2013), or about urban planning by playing the *SimCity* series (Maxis; the first game was released in 1989, and the most recent one, *SimCity BuildIt*, in 2014) or *Cities: Skylines* (Colossal Order, 2015). Games are also conducive to learning and experimentation by lowering the stakes of failure. Players have the freedom to probe the rules to discover what will happen, knowing that if it leads to failure, instead of being punished with serious and inevitable consequences, as they would in a real-world situation, they can try again, armed with more knowledge.

Autonomy is also encouraged by games as they give players agency in deciding if they want to engage in gameplay, which strategies they want to try, where they want to go, and what to do within the confines of the rules. However, building agency is not just about giving choices to players. They need to be meaningful choices: each choice should have an outcome and consequences dependent on that choice, and those consequences must affect the game in some way. For example, choosing where to go may open up some content and close access to other areas of the game world, or choosing to follow one character may make other characters less likely to help a player. While all games have choices, games such as *The Walking Dead* (Telltale Games, 2012) and *Life is Strange* (Donnod Entertainment, 2015) are examples in which choices have very visible consequences within the game world, leading players to feel responsible for what happens therein, an effect that is unique to this medium (Isbister, 2016).

Finally, relatedness can be encouraged by game designers by building opportunities for social play into the game system. The simplest way to do this is by incorporating cooperation or competition into the gameplay. Many games are single-player and played against the system, but many others can be played against other human players, or in multiplayer games, cooperating in teams against the system or against other teams of players. This is especially important when designing games for contexts that are conducive to social experiences, as is the case of museums. The social nature of games is also related to the concept of play as spectacle. Playing a game, when involving other players and outsiders to the game who watch the gameplay occur, can be considered a kind of performance (Férrandez-Vara, 2009). The spectator culture around games can be traced back to players watching each other play while awaiting their turn at gaming arcades, and to families and friends playing together in their living-room gaming consoles.

With the advent of the internet and networked play, during and after gameplay, players can find others who share their interests, play together, and share their experiences and strategies related to games. These social spaces and player communities often transverse into the physical world in the form of player gatherings, local area network parties, festivals, conventions, and formalized e-sports events, in which players compete against each other for prizes. These communities foster the creativity of players, who create new content for or around games, and share it online. Designers can create games that naturally encourage players to do this: for example, many games, such as *Neverwinter Nights* (BioWare, 2002) and the *Elder Scrolls* series (Bethesda, 1994 – present), include level editors which allow players to build and share content for the games. *Minecraft* (Mojang, 2009) is one of the foremost examples of games that focus on encouraging the collaborative creativity of players for its gameplay.

Motivation in games, which can be explained to a certain extent by the self-determination theory, is related to a combination of the elements, mechanics and effects. While players can be motivated by the prospect of achieving goals and receiving rewards, these are not necessarily primary motivations to engage in gameplay, especially since they tend to be related to external motivation. Players may feel motivated to initiate and continue playing because they want to be entertained, because of an interest in the game's theme, core mechanic, story or goals, the fact that the game is fun or teaches them something, that it allows them to cooperate with or compete against other players, and that it lets them exercise and validate their skills or develop new abilities (Salen and Zimmerman, 2003, p. 258). For game designers, recognizing the difference between the various types of motivation - what drives players to feel engaged, and the quality of engagement they lead to - is relevant for designing contexts that encourage sustained and long-term engagement.

Other effects that gameplay can have on players is encouraging feelings of flow and fun. The phenomenon of losing oneself in a deep sense of engagement with an activity has been described by psychologist Mihaly Csikszentimihalyi as an intrinsically rewarding experience which he termed flow (Csikszentimihalyi, 1975). Balancing the tasks in a game so that they offer a challenge to players that is neither too easy nor too difficult can help players lose themselves in gameplay. Flow happens when players 'experience a deep sense of immersion

and fun when presented with optimal challenges that result in a cluster of psychological experiences, including a blurring of the subjective distinction between the player and the activity, as well as feeling a lost sense of time' (Rigby, 2014, p. 116). Challenges which require skill, absorb the concentration of players by merging action and awareness, give clear goals and feedback, give meaningful choices and a sense of control to players, and allow players to lose their sense of self-consciousness and time result in flow (Isbister, 2016, p. 4). While it is not possible to design for flow, knowing when it can happen and how best to encourage it *is* useful when designing a game.

It is possible to establish a connection between all these game elements and mechanics with a characteristic that is fundamentally associated with videogames, even if it does not appear in the definitions explored earlier in this chapter: fun. According to Bogost, fun is not 'the experience of pleasure, but the outcome of tinkering with a small part of the world in a surprising way' (Bogost, 2016, p. 4). The reason it does not appear in the definitions is that games, despite the fact that they were originally created for the purposes of entertainment, are not necessarily fun. Fun - which can be defined as 'a positive emotional state of playful engagement: a pleasurable and active mental state in which one is intrinsically engaged' (Rigby, 2014, p. 116) - arises from different combinations of game elements and player preferences. It is, however, difficult to pinpoint how exactly fun can be constructed. Players can derive pleasure from the game's narrative, from the opportunity to roleplay a different character, and from the social play with other players, among other possibilities. The satisfactions inherent in understanding the game system, mastering the core mechanic, coming up with a strategy, developing skills and abilities, competing against or cooperating with other players, overcoming the challenge, and reaching the goal, are important factors in making a game fun. However, fun is not the primary focus of the experiences created for this investigation. Instead, the focus is on motivation and engagement.

Motivating players to engage in gameplay also depends on their individual and pre-existing preferences regarding different kinds of play and game elements. Authors such as Richard Bartle (Bartle, 2006 [1996]) and Nick Yee (Dixon, 2011, p. 2) have attempted to organize game players into taxonomies based on observed and self-described gameplay preferences, motivations, play styles, and

behaviours. Designing with specific player or visitor archetypes in mind is less useful than designing for certain types of experience, as preferences may change within a group or even for individuals at different times and in different spaces. Ultimately, the usefulness of discerning between player motivations is dependent on understanding that, even if players have fluid identities and preferences that change according to circumstances, it is possible to build experiences that are targeted at certain preferences.

Game design is the practice of using rules, game elements and game mechanics to create an interactive structure with a set of rules that allows certain types of choices and actions, while constricting others, and supports intended and emergent gameplay experiences; in short, 'designing *game play*, conceiving and designing rules and structures that result in an experience for players' (Salen and Zimmerman, 2003, p. 2). Game design has been compared to architecture (Chatfield, 2011; Sicart, 2014) in that the purpose of game design is to create an environment which encourages certain types of behaviour and interactions, framing choices and actions without directly controlling them. The design of games is, traditionally, an iterative process which emphasizes rapid prototyping and playtesting, in which decisions are made based on the experience of playtesters, who play a game while it is still in development. In short, it is a 'cyclic process that alternates between prototyping, playtesting, evaluation, and refinement' (Salen and Zimmerman, 2003, p. 11). This is because games are emergent systems: it is not possible to directly design the way people play, only the structures and contexts that give rise to and shape gameplay, so it is difficult to predict with precision how players will engage with and experience a game.

Game scholars have produced different game design frameworks, methods and strategies. Since one of the purposes of this investigation is to create a bespoke game design framework for museums, I do not follow a specific format or process, but my work is informed by the work of different authors and game designers, working on videogames and, most importantly for my work, pervasive games. Katie Salen and Eric Zimmerman's influential game design conceptual framework is built around three main schemas: rules, which describe the formal aspects of games; play, which takes into account the experiential nature of gameplay; and culture, the context in which that gameplay occurs (Salen and Zimmerman, 2003). Many of the concepts and game thinking that inform the design work in

this investigation, such as thinking of games as interactive systems of rules which support gameplay in specific contexts, were initially formulated here. Similarly, the MDA game design framework breaks games down into three types of components: mechanics, the basic components of the game; dynamics, the mechanics and actions enacted through the system; and aesthetics, the effects that the gameplay experience has on the player (Hunicke et al., 2004). The framework states that a game's mechanics result in a system that players can interact with in dynamic ways, resulting in an experience with its own aesthetics. This relationship between the design of mechanics and its influence on dynamics and experience informs my decision to study both specific configurations of the design process and the gameplay characteristics that emerge from them.

The biggest influence regarding my work when engaging in game design and creating the location-based game design framework for museums, to which the last chapter of this thesis is dedicated, is Markus Montola, Jaako Stenros, and Annika Waern's foundational work on the design of pervasive games (Montola et al., 2009b). Their book represents one of the first full-length academic works dedicated to pervasive game design, providing an overview of the field upon which forthcoming research, such as my own investigation, can be based. The guidelines for the creation of location-based games for learning devised by Carmelo Ardito et al also informed my work (Ardito et al., 2010). As I demonstrate in the next section of this chapter, not all pervasive games are location-based. Moreover, unlike the works referenced, the framework I develop in this investigation is specific to the context of museums. Ultimately, my work represents an additional and more focused thread in the study and design of pervasive games.

This section was an introduction to the basic constituent parts that make up a game, and which can be used by game designers to create a system that encourages certain types of gameplay and gameful experiences. While I did not analyse these elements, mechanics and gameplay effects in depth, it is useful to have them listed so that they serve as a reference when designing and developing games. My reasons for choosing to use them in relation to the effects that can be predicted from the literature and other case studies, are developed in more detail in subsequent chapters. The next section focuses on location-based

games, and the design strategies, game elements and mechanics, and types of gameplay that are particular to this type of game.

Location-Based Games: Definitions and Design

In this section, I continue my exploration into game elements and mechanics, which can be used by game designers to create the context and frameworks for gameplay, into those found in location-based games. I begin by defining the category of pervasive games, which are played in real-world locations and incorporate those spaces into gameplay, and detail the differences between location-based and location-aware pervasive games. I describe what the experience of location-based gameplay usually entails, discerning the configurations of game systems, mechanics, elements and interactions between particular types of games. Similarly to the rest of the chapter, this section establishes the language used to discuss location-based games, and identifies strategies that are put into practice and tested throughout the rest of the thesis. In the last section of this chapter, I bring together these gameplay and design lessons to introduce my initial location-based game design framework for museums, which is developed, put into practice and tested throughout the rest of the investigation.

A pervasive game is defined as ‘a game that has one or more salient features that expand the contractual magic circle of play spatially, temporally, or socially’ (Montola, 2009). In other words, the boundaries of space, time and social contexts in which these games are played go beyond what more traditional games require. Pervasive games are locative media, reconfiguring players’ spatial and social relationships through a combination of pervasive computing technologies and geographical space (Galloway and Ward, 2006). Pervasive games have been extensively studied in the last decade, including being the focus of the Integrated Project on Pervasive Gaming (IPerG), an EU funded project from 2005 to 2008. This project resulted in several publications and pervasive games, including Blast Theory’s *Day of the Figurines* (2006) and *Rider Spoke* (2007).⁸ Pervasive games incorporate aspects of digital games, performing arts, and storytelling, extending gameplay into spaces of the real-world that are not specifically reserved for gameplay. They often, though not

⁸ For more information, see Blast Theory’s webpage about the project: <https://www.blasttheory.co.uk/projects/iperg/> (accessed January 2019)

always, employ mobile technologies with sensors that capture information about the physical space such as players' locations, environmental sounds or proximity to certain sites, and which convey information back to players (Benford, Magerkurth, and Ljungstrand, 2005). The positioning of players is less important than the fact that the gameplay takes into account the fact that they are able to move through space, creating a dynamic relationship between players, game data and the world (Hemment, 2006).

Pervasive gameplay can take many different forms and structures, from being played in short periods of time to extending for months or years, from requiring minimal engagement from players to encouraging them to adopt and roleplay entirely new identities, and from using complex technologies to using no digital technology at all (Montola, 2009). Specifically, some games trace the location and movements of their players and use digital technologies to overlay a game layer onto the real-world, creating a space that is at once authentic and fictional, physical and digital (Montola et al., 2009b, p. 77), whereas others, as is the case of live-action roleplaying games, rely entirely on reshaping physical environments which become the game world in which players are immersed. In all of them, the real-world becomes an important part of gameplay, so that players 'inhabit a game world that is present within the ordinary world, taking the magic circle wherever they go' (Montola, 2009, p. 12).

The term pervasive game started being used in 2001, when games such as *The Beast*, *Majestic*, and *BotFighters* were launched (Montola et al., 2009b). While it is possible to identify antecedents for pervasive games in the Situationists International and their concepts of *dérive* and psychogeography (Alfrink, 2014), which encouraged a playful connection to urban physical environments, and in practices such as scavenger hunts, parkour, free running and geocaching, the first experiments with pervasiveness in games can be traced back to live action-roleplaying games, and later, prototype games created for niche audiences often shown in the context of museums or art exhibits (Nova, 2014; Walz and Deterding, 2014, p. 3). The developments mentioned earlier in this chapter, regarding the widespread access to the internet, cheaper and more accessible portable and personal technologies, as well as the data collecting capabilities of those technologies, made digital games increasingly pervasive. The image of isolated gamers, staring at fixed monitors for hours, rarely leaving the house or

socialising, finds a counterpoint in the fact that games have always had some form of pervasiveness, from board games being played in non-dedicated gaming spaces such as cafes and living rooms, to live-action roleplaying games that transformed real-world locations, from fields to city streets and historical palaces, into fictional game environments in which players physically play out the roles of their characters. Pervasive games are often played with the use of mobile apps or websites, but they differ from gamified apps in that they do not have an instrumental use besides entertainment or art. Despite the difference in the intention, the format of these experiences and the gameplay they afford are in how that gameplay becomes enmeshed with the players' everyday life.

Montola's definition of pervasive games mentions their expansion of the magic circle of play (Montola, 2009). As mentioned previously, Huizinga established the concept of the magic circle in order to separate the space of play, with its own rules and meanings, from the real-world (Huizinga, 1980 [1938]), and the same concept has been adopted by games, becoming widespread among game studies scholars after Salen and Zimmerman's influential book on game design, *Rules of Play* (Salen and Zimmerman, 2003).⁹ Pervasive games are based on the expansion of the magic circle and the blurring of boundaries between gameplay and the real-world.

The antecedents for pervasive games which mix digital and physical components and can be played at any time, can also be found in dedicated handheld gaming devices, such as Nintendo's *Game Boy* from 1989 (Stenros and Montola, 2009). The experience of playing a digital game has always been dependent to a certain degree on the location where it is played, from bedrooms to living rooms, to communal spaces such as cafes, universities and arcades (see Huhtamo, 2005 for a historical study of arcades as social gaming spaces). Starting from the 1990s, multiplayer online gaming gave rise to competitions, many of which required players to physically gather in meeting places (King and Borland, 2003). Ubiquitous and continuous access to the internet has changed the way we navigate and experience physical space and how we socialise, as we carry the

⁹ The concept and its application to games has since been contested by several authors, who defend that games cannot be considered separate from the rest of the world (Woodford, 2008; J. Zimmerman, 2010). Despite this, the magic circle metaphor can still be useful when applied to games, if viewed as a fluid and permeable demarcation, best described as a layer or frame, rather than a clear cut separation.

web with us, instead of accessing it from limited and specific points (Gordon and de Souza e Silva, 2011), allowing gamers the possibility of always being connected and playing. This expansion of the real-world spaces where games are played paved the way for the establishment of pervasive games (Stenros and Montola, 2009).

These types of games can take many forms, according to the technology used, the format they are designed to have, and the gameplay they encourage. While games in more traditional formats are unlikely to disappear, digital games which implicate physical spaces in gameplay, some of which can be accessed and played at any time, have seen a recent rise in popularity. The most visible example from recent years is *Pokémon Go* (Niantic, 2016), an augmented reality, GPS-enabled mobile game which allows players to capture and train virtual creatures, called Pokémon, in real-world locations, as well as battle against other trainers and capturing physical locations for their teams. Live-action roleplaying games, or LARPs, on the other hand, are storytelling games in which players physically embody and act as their characters, and which do not necessarily require the use of digital technologies. While they have existed for many decades, these games are also rising in popularity, with festival-based LARP events such as *Empire* (Profound Decisions, 2013) and *Lorien Trust* (Merlinroute Ltd., 1992) drawing thousands of players to each event (J. Falk and Davenport, 2004). As for alternate reality games, or ARGs, they create a complex game layer which is added to the real-world, taking advantage of the internet to organise players across the world over a long period of time. An early and influential example is *I Love Bees* (42 Entertainment, 2004), created as a marketing effort for the videogame *Halo 2* (Bungie, 2004), which engaged players' attention for several months through clues, storytelling and puzzles spread out through the real-world and online. Finally, escape rooms, in which small teams of players are locked into a physical location for a limited amount of time and need to work together to solve the puzzles around them in order to escape and win the game, are also becoming more numerous and sophisticated (Nicholson, 2015). In the United Kingdom, it is possible to find escape rooms with diverse themes, from science fiction, to horror, fantasy, history and mystery. Other emerging gameful experiences which implicate the real-world as part of their experience, but which are not usually

classified as games, include live cinema and immersive theatre. I look into these experiences later in this chapter.

The distinct but overlapping categories of pervasive games, from mixed reality performances, to alternate reality games, escape rooms and live-action roleplaying games, as described above, are templates from which gameplay and design lessons can be taken. These categories refer to the way that the game system works regarding the relative importance in these pervasive games of digital technologies, performance and theatre, storytelling, roleplay, gameplay duration and environment. However, and most importantly for this investigation, pervasive games can also be categorised according to their relationship to physical location, leading to the distinction between location-aware and location-based games.

Space and place are used here to refer to overlapping, but distinct concepts. Space refers to a physical area or location without specific meanings, whereas place is a human creation arising out of the combination of a physical space with the social connections, values, meanings, stories, history, understandings of appropriate behaviour, and other cultural expectations associated with it (Harrison and Dourish, 1996; Tan, 2001 [1977]). Pervasive games appropriate physical space, architecture and objects in the real-world, making them part of the gameplay experience. However, not all pervasive games specifically respond to and incorporate a particular place, its rules and characteristics (Montola et al., 2009b). Instead, games such as *Pokémon Go* (Niantic, 2016) can be played anywhere, dynamically adapting to and appropriating real-world locations and making them part of the experience. In games such as these, real-world locations become part of gameplay insofar as they serve as the game's environment or landmarks to guide the player within the game (H. Davies and Innocent, 2017). These games can be classified as location-aware, site-responsive, or site-adaptable, meaning that they are created with an archetype of a place –a church, a school - in mind, but the specific one in which they take place does not change the experience in fundamental ways (Montola et al., 2009b). Conversely, pervasive games can be location-based, or site-specific. Instead of randomly adding a game layer to a space, location-based games are either created specifically for a certain location or must be heavily adapted to each new setting, responding to and incorporating the characteristics, history, ambience,

architecture, meanings and stories from the place, effectively becoming a localised variant of an existing game. In short, location-aware games are created to be played in a space, whereas location-based games are designed for a specific place. The decision to focus this investigation on location-based games, rather than digital games or pervasive games, follows the fact that museums are better classified as places, with unique histories, stories, rules, architecture, values and meanings attached to them, rather than abstract spaces.

The spatial expansion of location-based games translates into engagement during gameplay which is based in exploration and navigation. Therefore, the design and gameplay of location-based games presents specific challenges derived from their relationship to place. Games have a unique relationship to space, in that unlike other media they present players with a world that is not simply a stage, but allows for exploration and intervention. In digital games this happens on screen, with players manipulating controllers to move their avatars or on-screen representations. In location-based games this happens in the physical world, and players have to move their entire bodies in order to explore and navigate. Another difference is related to the location where each type of game is played. Sports games, for example, cannot be separated from the characteristics of the physical environment in which they take place, while tabletop games need a temporarily dedicated space and surface to be played on. Videogames are generally created to be played anywhere, as long as the technology is available and can be used. Conversely, in location-based games the location where the game is played and the space that makes up the game world are the same.

Designing location-based games can be described as creating a game layer to be added on top of the physical places that we are trying to make more gameful, which results in a hybrid game world that players inhabit and navigate while playing. The physical characteristics and configuration of a place need to be taken into account by game designers, as they determine the actions that are possible or desirable for players to engage in during gameplay. Gameplay in location-based games is emergent, meaning that even simple actions and decisions may lead to complex and unplanned interactions, and more so as these games take place in environments with unpredictable characteristics, particularly if the location is not used exclusively for the game (Montola, 2009, p. 18). This is

the case with museums. It is also important in terms of access and navigation. Players getting lost and wandering into places that are off limits or potentially dangerous is a possibility when playing in non-dedicated locations. In terms of navigating the space, the rules of that place need to be taken into account, the possible paths taken by players have to be optimised, and their movements limited. The amount of people who can play at any time and where they are at all times needs to be considered, as this will change the atmosphere and experience of the place for those who are not playing. In short, the gameplay experience and the players' movements need to be choreographed, more so than when designing other types of games.

In order to make sure a game is location-based, it is important to consider the place in terms of gameplay, but also the game's theme, so that the game world - which is a mix between the physical and digital layers - feels seamless and logical. The pre-existing places in which the game is played are appropriated, and may or may not be modified to fit the game world and gameplay better. If these places, such as museums, are familiar to players due to previous experiences, the game contributes to changing their perceptions about those places (Montola et al., 2009b, p. 89). Game designers should study and experience the place they are designing the game for, its history, stories, rules, values, symbols and meanings, and incorporate those into the game world or gameplay. The exact ways in which this can be done will depend on the particular place and desired engagement for players.

Location-Based Games: Examples Beyond Museums

In this section, I look into specific examples of location-based games, in different contexts and created for various purposes, in order to draw design and gameplay ideas. What follows is an analysis of several location-based games, chosen for their particular characteristics and places they were designed for, and the lessons that can be gleaned from them regarding design and gameplay.¹⁰ I also include

¹⁰ The experiences analysed were chosen to illustrate the breadth of approaches and strategies. As the possible examples, antecedents and influences are too numerous to list and analyse in this thesis, this choice was influenced by accessibility, whenever possible giving priority to those that I was personally able to experience. These include *Operation Black Antler* (Blast Theory, 2016), *Pokémon Go* (Niantic, 2016), *Hunt for the Cheshire Cat* (HiddenCity, 2017) *Empire* (Profound Decisions, 2013), *The Celestial Chain* (Time Run, 2017), and *Secret Cinema Presents Blade Runner* (Secret Cinema, 2018). In case that was not possible, the examples included were based on the wealth of information available, in the form of academic writing or documentation. Other examples would have been possible and legitimate, and this list

games which are location-aware, but which dynamically adapt to the place they are played in even though they were not specifically created for that place. Although not taking place in museums, the lessons learned here are transferable to the design of location-based games in museums.¹¹

Some of the earliest and most influential examples of pervasive games that blend digital technologies with performance and the real-world, in order to create mixed reality performances that resemble games, were created by Blast Theory, an art collective currently based in Brighton, led by Matt Adams, Ju Row Farr and Nick Tandavanitj (Benford and Giannachi, 2011). By the late 1990s Blast Theory had become aware of the growing cultural influence of games both in and outside entertainment, with the increasing popularity of lottery culture, reality television, and mediated violence. These themes, together with surveillance, were explored in the work *Kidnap* (Blast Theory, 1998), in which members of the public entered into a lottery to be kidnapped by the artists, the resulting event streamed online in real-time. Around the same time, Blast Theory began collaborating with the Mixed Reality Lab at the University of Nottingham, to create *Desert Rain* (Blast Theory, 1999), the first of their works that can be considered a game. Inspired by war-themed first-person shooter videogames, *Desert Rain* is, according to Nick Tandavanitj of Blast Theory, 'an explicit reference point for people to reflect on virtuality and ethics within virtual spaces' (N. Tandavanitj, personal communication, 13 June, 2016; see Appendix A.4.5). The work encourages reflection by intentionally blurring the lines between the fictional and the real. It foreshadows some of the directions in which the artists have since taken their work involving games: the goal of the game is not to achieve a winning condition, but to facilitate player engagement and encourage reflection on their behaviours and on the mechanics of the game. Observing these and later works, such as *Can You See Me Now?* (2001), *Uncle Roy All Around You* (2003), *I Like Frank* (2004), *Day of the Figurines* (2006), *Ulrike and Eamon Compliant* (2009), *A Machine to See With* (2010), and *Operation Black Antler* (2016) allows the

is not meant to represent a judgement on the relevance of the experiences that were not included.

¹¹ One type of gameful location-based experiences that I do not go to in this section, as they are not a category of location-based games, but which influenced my considerations of game culture, are events organised to celebrate games and the people who play them, such as LAN parties, eSports competitions and conventions, as well as YouTube channels and streamers.

identification of certain thematic and systemic lines in Blast Theory's work. These works exhibit characteristics from live action roleplaying games, performance art, digital games, and immersive theatre.

Even though not all of Blast Theory's works are location-based, their productions present us with experimental work being done in mixed-reality games and teach valuable lessons about designing those experiences. *Operation Black Antler* (Blast Theory, 2016), for example, can be classified as location-based insofar as it was created in response to a specific political climate in the United Kingdom. While it has travelled across the country, from Brighton to Chatham and Manchester, it would have to be extensively modified, both thematically and in terms of design, in order to work in a different country. The experience is participatory and personalised, as it is impossible for each participant to follow every thread in the experience, and focused more on process rather than object. Participants are able to actively influence the outcome of the work, are invited to reflect on themes and create content in response to prompts, and the many choices inherent within the game system mean that each player can potentially create his or her own personal trajectory, or path, within the constraints of the experience orchestrated by the artists (see Benford and Giannachi, 2011 for the use of trajectories as a way to study mixed-reality performances). While participants can cooperate, the focus is not on being better than others or striving towards a goal, and is instead on creating an experience through performance, play, social connections and spectacle. The implication of non-player bystanders is particularly important for these experiences, not only because they tend to create spectacle and therefore attract the attention of outsiders to the game, but also because they often intentionally involve those bystanders as part of gameplay. As *Operation Black Antler* takes place in a pub which stays open to the public while the event occurs, participants can never be sure of who is part of the performance, and when they are, if they are performers or other participants.

The artists use game structures and elements in order to blend a fictional game layer onto real-world spaces, expanding the magic circle of play in social, temporal and spatial ways. In *Operation Black Antler* they use these strategies to create discussions on real-world politics and events, inviting players into situations where they are not given clear-cut answers, but are instead encouraged to reflect on their own personal beliefs and actions related to those

issues.¹² As they are created by artists, these experiences naturally fit museums and other cultural institutions. Blast Theory created *Ghostwriter* (Blast Theory, 2012) for RAMM, a gameful audio tour that is loosely structured like a branching narrative game, and which I analyse in chapter two of this thesis.

Location-based mobile games are created for entertainment or with utilitarian aims in mind, such as health, sustainability, marketing or education. The practice of creating mobile games for entertainment that incorporate real-world locations into gameplay has been popularised by science-fiction mobile game *Ingress* (Niantic, 2012), and, most recently released by the same company to widespread popularity, *Pokémon Go* (Niantic, 2016).¹³ An early antecedent for this game is *Pac-Manhattan* (Frank Lantz and students in NYU's Interactive Telecommunications Program, 2004). *Pac-Manhattan* draws its gameplay inspiration from the influential classic game *Pac-Man* (Atari, 1980), and from the fact that certain streets of Manhattan share similarities with the grid in which the original game is played. In this game, a player dressed as Pac-Man runs around the Washington Square park area of Manhattan, collecting virtual dots while avoiding four other players dressed as ghosts (Lantz, 2009). The game does not depend heavily on technology, relying instead on a team of game masters who use custom-built software to track players' positions and progress in collecting the dots (New York University, 2004). By translating *Pac-Man's* grid-based gameplay into a physical, real-world environment, the dynamics afforded by the game are transformed, and a new kind of gameful experience emerges, one that re-imagines the city streets as game board.

Pokémon Go, as mentioned before in this chapter, reacts dynamically to urban space, adapting its map and game board to reflect the player's current GPS location. Places such as landmarks, which include short descriptions of those places, become co-opted into the game as locations in which players can undertake special actions, such as engage in competitive play, 'capture' those locations for their teams, or acquire special objects to help them during gameplay. Progress in the game is also dependent on the players moving through their

¹² For a detailed, first-person account and analysis of *Operation Black Antler* (2016), see Romualdo, 2016.

¹³ Released on 6 July 2016, in less than a day, this game became the top-grossing app on the Apple Store. Its widespread popularity made headlines across the world, as multitudes of players explored their real-world surroundings in order to play (H. Davies and Innocent, 2017).

physical environment, as the number of steps is counted towards certain goals in the game. However, the connection between the game and the physical location is superficial, in as much as it does not matter where the player is, the gameplay experience, theme and actions possible are exactly the same, with the only change being related to the configuration of the space. Nevertheless, *Pokémon Go* represents the most mainstream example of location-based gameplay and opens the way to the normalisation of this type of practice and exploration of new ways to implement it.

An example of a mobile game created for entertainment that was built specifically for an urban location is *Hunt for the Cheshire Cat* (HiddenCity, 2017). Played in London, the game was created through the layering of an existing story - Lewis Carroll's *Alice in Wonderland* (1865) - over the city of London, guiding players around London as they follow cryptic clues and communications from the Cheshire Cat and other characters. The city's streets, bookshops, cafes, pubs, museums, and other locations are incorporated into the story and gameplay. These locations and the puzzles therein were chosen for their relationship to the story, imbuing those real-world spaces with a layer of absurdity and strangeness. Besides giving players challenges based on their surroundings, the game encourages players to interact with the people who work in the spaces they encounter, either through buying a refreshment, asking for tips or giving players certain objects of importance in the game. The gameplay is entirely based on text messages between the players and the game system, which sends puzzles and questions to players and detects when they send the correct responses back. The narrative has points in which it branches, allowing players to decide if they will help the Cheshire Cat or the Queen of Hearts, which changes the experience in small but fundamental ways, including the story and the rewards for finishing the game. Unlike the other games mentioned in this section, *The Hunt for the Cheshire Cat* works as an event with a clear beginning and end. The time limit is further enforced by allowing players to compare themselves to other teams and their timings.

Mobile location-based games which were created with aims other than entertainment include *Zombies, Run!* (Six to Start, 2012), which promotes exercise by reframing running as part of a fictional dystopian game world, conveyed to the player by an immersive audio narrative. In this story, the player

is a human survivor being chased by zombies during an outbreak and must keep running both in the game world and the real-world, to stay alive and complete missions (Kan, Gibbs, and Ploderer, 2013). Running is the main game mechanic, as the game records the distance, speed, time and even calories burned during each mission, encouraging players to push themselves by requiring them to periodically run faster or risk getting caught. As the player runs, they also unlock the narrative, which gives them extra motivation to keep going. In sustainability, *Chromaroma* (Mudlark, 2010), launched in London in 2010, tapped into data produced by users of the Oyster Card, the city's RFID-enabled public transport pass. The game was played passively in the background as players went about their daily commuting: every time a player swiped their card when entering or leaving a tube station, points were earned. Bonuses and unlockable content could be accessed by traveling environmentally-friendly routes, avoiding rush hour travel, and choosing to walk or bike instead of using buses and trains (Alfrink, 2014, p. 541). Players were rewarded with a score that put them on a leader board, but also with stories about London, some factual and others fictional. *Chromaroma* required its players to not just use the public transport system but to truly understand it, and rewarded them with factual and fantastical stories about the system, adding a narrative layer that imbued their commute (Alfrink, 2014). The app made commuting gameful, encouraging players to be more sustainable and to experiment with following new and more efficient pathways through the city.

Finally, there are several examples of mobile games and apps created to engage players with the heritage of specific cities. *Hidden Florence* (Fabrizio Nevola, David Rosenthal and Calvium, 2014) offers a playful way for visitors to engage with stories in the Italian city, while *REXplorer* (Steffen P. Walz and Rafael "Tico" Ballagas, 2007) is a location-based game targeted at tourists to the town of Regensburg in Germany, a UNESCO world heritage site. Both experiences were built with the purpose of encouraging engagement with that city's history and culture, as well as exploration of spaces and locations more diverse than the ones indicated in tourist guides. *REXplorer* casts players in the role of researchers who must uncover the truth behind paranormal activities that have been spotted throughout the city (Ballagas and Walz, 2007). In order to do this, players must make specific movements with a hand-held detector - a mobile phone with a GPS

detector that is provided by the tourist office - in order to cast spells that summon historical spirits at different locations in the city. These spirits tell players their life stories which are connected to different historical epochs of the city's past, and give players messages that they must take to different locations. As players become immersed in the game, solving puzzles and going on quests, they gain knowledge about the history and culture of the city (Ballagas and Walz, 2009).

REXplorer shows how giving players who are already interested in the place and subject matter a role that does not require a lot of effort from them and that makes sense within the game world and the theme, can help them engage. The game takes advantage of the capabilities of portable digital technologies, such as GPS, recognising hand gestures, the ability to take photos, which are catalogued and shared into a weblog, among others (Ballagas and Walz, 2009). However, unlike the other mobile games mentioned here this game does not make use of the personal devices of players, and instead lends them one purposely built for the experience. While this makes it more likely that the experience will not break for technological reasons, it also increased the barrier to engagement by requiring players to use a device they are not necessarily familiar or comfortable with.

These games exemplify design strategies for adding a virtual game layer to real-world locations, incorporating their physical configuration into the game space. Existing spaces are appropriated and re-encoded so that they become invested with new meanings and allow for new actions as part of the gameplay. The resulting hybrid game world is composed of the digital game layer, the real-world, and meaningful links between both, through the appropriation of events, objects, architecture, street configuration, stories, people or situations. Engagement with the real-world is re-structured as part of a story or a journey towards a goal. Urban spaces in particular showcase how location-based games can transform the ways people interact with and experience places familiar to them by adding new meanings and stories to them. Storytelling is a strong strategy for creating motivation to continue engaging in gameplay. With the exception of *Pokémon Go*, which relies on the mechanics of exploration and collection, and does not have a strong narrative component, all the games mentioned in this section rely on exploration and incremental progression in a story, sometimes with the addition of puzzles or other types of challenges. Instead of one goal which ends the game, finding out the story becomes an ongoing reward. Cooperation and competition

are usually included, but they are not the main focus. Lastly, these experiences rely on the sensors available in digital technologies, including GPS and accelerometers, to detect movement and certain gestures. These games and their design strategies can translate into a museum space by making sure that any puzzles and exploration are specific to that space. I analyse some of these experiences in museums, such as Fire Hazard Games' *Raiders of the Lost Archive* series (Fire Hazard Games, 2016 – ongoing), in chapter four of this thesis.

Alternate reality games (ARGs) are cross-media games which make use of technologies, especially the internet, but also radio, television, newspapers, telephones, and anything else that can be used to reach players, to enmesh the game world and its fiction within the real-world. An example of an ARG created in London, *Perplex City* (Mind Candy, 2005) re-imagined the city and its surroundings as a setting for an alternate reality (Mind Candy, 2007). Created by London-based creative team Mind Candy, the game used the internet as a hub to organize the community of players, distributing its puzzles in the form of collectible cards, drawing inspiration from collectible and tradable card games. The clues to solve the puzzles required players to step into the real-world: some could be found in newspapers, others involved talking to strangers on the phone, or travelling to certain locations (Moseley, 2011). The game required cooperation between players, as it would have been difficult for a single player to travel to all of the real-world locations implicated and have the abilities and time required to solve all the puzzles. This resulted in an online community of dedicated players who regularly engaged in discussions about the game, who felt motivated to keep playing in order to unravel the plot, and for the satisfaction of solving the puzzles (ibid). *Perplex City* is one example of a game harnessing several different communication media available to create a complex game layer, using the real-world as a basis for immersive storytelling.

In ARGs, the main game mechanic is puzzle-solving, in cooperation with other players, without whom the challenges can become impossible. They differ from the other categories of games in their use of technology, which is essential for their design. ARGs are heavily based on meaningful choices by players, which influence how the story plays out. While not always location-based, ARGs incorporate real-world locations into parts of the gameplay experience, and those

parts are location-based. ARGs have been developed for museums: in the United Kingdom, for example, *Art Heist* (Coney, 2010), which I analyse in chapter four, took place at the New Art Gallery Walsall, and involved participants in a fictional story about art, its ownership and value. Engagement with the game started before the event, with the gameplay in the gallery making use of the space and the people who worked there. More than other types of location-based games, ARGs require careful orchestration of gameplay both before the game and while the game is taking place. Since the design of ARGs requires considerable investment in terms of time and resources, it was ultimately not feasible to create one as part of this investigation. As is the case of other categories of games, such as live-action roleplaying games, these present possible venues for future research in this field. However, these games are still useful in showing how stories, locations and objects can be combined with puzzle-solving and cooperation, how to use various technologies to create a believable game layer, and how gameplay can be orchestrated by designers to create more directed experiences, while still allowing for agency. As such, I analyse them in chapter four of this thesis.

Escape rooms are live gaming events which require players to work together to solve puzzles and complete challenges, in order to escape a location within a limited period of time (Nicholson, 2015). Escape rooms, which have been steadily increasing in popularity in the last decade (ibid), are location-based in that they cannot be separated from the physical environment in which they are played, but this environment is usually built from the ground up for the game and is largely independent of the real-world context in which it is situated. They may be comprised of one or several rooms, with sophisticated set design which incorporates puzzles for the players to solve. Escape rooms often incorporate a narrative, both as setting and to provide a goal, although the focus of these games is less on the story and more on the challenges presented to the players by the game environment. Players are greeted and accompanied remotely by a game master, who is often in character and part of the performance, and switches to monitoring how things are going, orchestrating gameplay and helping players should they require it.

A London-based example of an escape room is *The Celestial Chain* (Time Run, 2017). In it, players become immersed in a time travel story, set against lavish

environments which reflect the different time periods through which players are taken for a fixed period of time, during which they must solve puzzles to acquire artefacts that will help them in the final room of the experience. The puzzles are varied in that some require physical interaction, mathematics, logic, careful communication and coordination between team members, exploration and discovery, codebreaking, listening to musical notes, among other skill sets. The experience also incorporates other characters, who interact with players through videos that are presented as part of the set design. While the story is successful in providing a backdrop, the main focus of the game is environmental puzzle solving.

As the built environment and the puzzles therein are the most important part of game design in escape rooms, lessons from these games are related to set design, and the ways that the environment and the puzzles themselves tell the story. These puzzles can be designed to be solved simultaneously, in any order the players wish, or in an incremental way where solving one puzzle opens up another, which creates a more guided gameplay experience (Nicholson, 2015). Escape rooms also teach us about designing puzzles that require collaboration and communication between players within a limited period of time, which increases the urgency of the experience. Unlike other categories of games in this section they do not require roleplay from players beyond knowing their goals in the story. In museums, escape rooms are either added to a space separate from the galleries, as was the case of *Mystery in Frankenstein's Lab* (Atomic Force Productions, 2018) in the Science Museum in London, or experiences which adapt the format to require players to 'escape the museum' within a set period of time, but without actually being physically locked in it. While it is not feasible for museums to alter their physical environments specifically to incorporate puzzles, it is possible to create those physical puzzles as temporary additions to the museum space. Escape rooms show us how to tap into different skill sets from players for puzzle-solving, and in museums this can be combined with puzzles that reflect learning objectives (S. Clarke et al., 2017). As part of this investigation, lessons from these experiences are applied in chapter four, in which I contribute to the design of and study an escape the museum experience.

Live-action roleplaying games offer a different example of how games can use the location they are played in. Influenced by cultural phenomena such as

historical re-enactments and role-playing games such as *Dungeons & Dragons* (Gary Gygax and Dave Arneson, 1974), a LARP is distinctive as a category of location-based games as it is a system for emergent storytelling in which players assume the role of a character that they physically play in person during game events, making choices, carrying out actions and interacting with other players and the game world as if they were that character. This occurs in a space that, through set design and upon agreement between everyone involved, becomes the game world governed by its own set of rules (J. Falk and Davenport, 2004). As with tabletop role-playing games, themes and settings are often inspired by fantasy, science fiction, or history. Gameplay in LARPS is emergent and improvised, with the game world and its story largely influenced by players' choices and actions.

An example of a UK-based LARP is *Empire* (Profound Decisions, 2013 – ongoing). *Empire* takes place during four events throughout the year, each spreading through a total of four days of which two are 'in character time-in', meaning that anything that happens counts as part of the story, whereas the rest of the time is dedicated to 'out of character' preparations and setting up. These events, while limited in time and space, are part of a larger story world that has been going on since 2013. Outside of those events, in what is called downtime, the game world continues to evolve as the organisers take into account what players decided to do during the events, calculate the consequences of those actions, and present them back to players in preparation for the next event. During an event, players are free to decide what to do with their time. The actions and activities depend on criteria such as their character's profession, nation, specialisations, and personal preferences. Possible activities include fighting, healing, political discussions and diplomacy, military planning, religious and magical practices, treason and treachery, socialising, exploring, influencing, music, theatre, eating and drinking, making and selling wares, and anything else they decide to self-organise. Often, these actions require 'physreps', or physical representations, of the in-game objects they portray and which have specific rules that need to be respected when being used; there are tangible representations of the game rules. Respecting these rules is largely self-policed, but there are referees among the players to solve the more contentious situations. Becoming

immersed in the game world and a part of the story while roleplaying is the main mechanic for these games.

LARPs such as *Empire* are location-aware, insofar as they can take place anywhere but the space has to be modified and adapted to match the game world. Other LARPs may be location-based if their theme and story are based in the place they happen, such as a city or a museum. They are examples of how environmental storytelling, achieved through set design techniques that change the physical location, can be used in games to create immersion. Immersion is also achieved through the use of costumes and props by players, who create their characters and are in control of who they are, what they look like, and what they do. Roleplaying is the main game mechanic, and it becomes a type of performance, with gameplay becoming a spectacle. Non-player characters, often played by members of the game's crew, are living points of interaction for players, not entirely controlling what happens but nudging the narrative forward. In the use of set design, costume, roleplay, and non-player performers, LARPs share a connection with theatre, more than other types of games. There are crucial differences, such as the fact that players have more agency than an audience, which even in immersive and participatory theatre, is rarely able to influence what happens, and can only choose where they go and who they interact with. Here, the storytelling is collaborative and the narrative is emergent, with gameplay often becoming unpredictable. The creativity and agency of players is engaged and they become co-creators of the story. They do not necessarily have goals, except those that are self-imposed. Each player has their own personal and unique experience, as LARPs are not created to provide a singular core experience (Stenros and Montola, 2010).

Just as with escape rooms, LARPs do not necessarily make use of digital technologies. However, their design requires extensive resources, with the involvement of performers or an extensive crew of organisers, and it is often necessary to change the physical environment to match the game world. While it is possible to consider that this can be done in museums, the extensive resources required make it a more difficult proposition for museums than, for example, creating gameful, immersive theatre performances. However, they are examples of how to incorporate roleplay, agency and meaningful choices into the design of location-based games.

Finally, as mentioned earlier in this chapter, there are experiences which, while not categorised as full-fledged games, exhibit characteristics that make them gameful. As I indicated in the introduction, some of these experiences - including live cinema and immersive theatre - are useful for this investigation as they have enough characteristics in common to show possibilities for the evolution of location-based games, in the ways that they can become increasingly immersive and performative, as well as showing how experiences outside games are adopting gameful characteristics. Their inclusion follows the same logic as applied to the decision of following a broad definition of games, as the aim is to include the experiences that are at the edge of definitions and categories. In this section, I analyse these experiences and draw conclusions on methods of designing them, particularly when it comes to the use of physical environments, and how those methods translate into the participants' experiences.

The term immersive is currently used to describe a genre of theatre and performance experiences which blur the boundaries between performers and audience, requiring from the audience an active degree of participation that makes them central to the performance. Participants step into evocative environments specifically built for the experience, where all their senses are engaged and they become 'a living part of the aesthetic' (Machon, 2016, pp. 29 - 30). The diversity of experiences that come under this term ranges from large-scale multimedia theatre to intimate performances (Klich, 2016, p. 223). Immersive performances differ from more traditional theatre productions in that there is no stage, the set is navigable by the audience, which becomes part of the performance, and performers respond to the audience's presence in small ways.¹⁴ Immersive is a term that has been used to describe games, particularly virtual reality games, which rely on technology to take over the player's senses and making them feel like they are inside the game world, but is applicable to any game in which players get lost, achieving the experience of flow. Immersion in a videogame is not the same as immersion in theatre, as a digital or virtual reality

¹⁴ In terms of historical precedents for immersive theatre and performance, they range from Augusto Boal's Theatre of the Oppressed, a term that describes a theatrical form developed by this author in the 1950s which includes invisible theatre performed in public spaces to encourage political engagement (Stenros and Montola, 2009), to Richard Schechner's environmental theatre, and before that, to Wagner's *gesamtkunstwerk* and total theatre (Klich, 2016).

game lacks the materiality which can be found in immersive theatre productions (Klich, 2016). This exists, to an extent, in pervasive games, but although the terms are often used to refer to similar characteristics, being pervasive or location-based does not necessarily imply that a game is immersive.

While immersive theatre and performance art differ from location-based games in several ways, there are many points in common. Location-based games are by their nature immersive, as players cannot help but be immersed in the real-world. Therefore, the designation is not as important here as the parallels that can be established between gameful immersive theatre pieces and location-based games. If location-based games incorporate performances, as is the case of several of the experiences analysed in chapter four, they can be considered as being on a continuum, from games with performance and theatre elements, to theatre and performance with game elements. The addition of actors, performance and theatrical environments to location-based games has the potential to make them feel more real. Giving participants opportunities for interactivity, choices and a personalised experience within the boundaries of a theatre production brings with it a sense of empowerment (Biggin, 2017, p. 61). In summary, immersive theatre puts the audience at the centre of the experience, making them part of the performance by being responsive to them, and creates a more intimate and personalised experience by empowering them to choose where to go, what to do, and how to interact.

In the United Kingdom, Punchdrunk are pioneers in the field of immersive theatre. Founded in 2000, their work combines immersive set design, storytelling, physical performance and audience interaction to create participatory experiences that are often intimate and transformative. Their immersive theatre productions temporarily put participants into a world which immerses them and operates under its own set of rules, often approximating them into players, by giving the agency of setting their own paths, deciding where to go and what to explore, how to interact and respond to the environment and the performers, following goals they set for themselves, and letting them piece together their own personal perspective of the story (Klich, 2016). However, while there are points of connection between Punchdrunk's works and games, they differ in many ways. Their performances typically rely on set design, and the location in which they take place is modified according to the needs of the performance, rather than the

performance being designed to refer to and incorporate the characteristics of the site, beyond the physical layout and structure. This leads to these productions being described as site-sympathetic, rather than location-based or site-specific, as theoretically they can and have been moved to other locations, including other countries, without significant changes in the experience (Biggin, 2017, p. 184). Other companies whose work falls under the broad category of immersive theatre include Coney, whose work I analyse in chapter four of this thesis. Several Coney productions are best described as alternate reality games or immersive gameful experiences, and the work they have developed in museums is an example of how games and theatre can be combined to create location-based games.

Intricate and immersive set design is also a distinguishing feature of live cinema experiences, or experiential cinema. These experiences can be described as 'film-screenings [...] augmented by synchronous live performance, site-specific locations, technological interventions, social media engagement, and all manner of simultaneous interactive moments including singing, dancing, eating, drinking and smelling' (Atkinson and Kennedy, 2016, p. 139). The focus of these experiences is not on telling a story, but on creating an immersive and believable world that serves as a thematic environment in which the film is subsequently watched.

The foremost producer of live cinema experiences in the United Kingdom is Secret Cinema. Participants enter a set purposefully built to mirror the world of the film, inhabit it for a few hours, and then join a screening of the film often accompanied by live re-enactments of scenes. Live cinema relies more heavily on participants becoming part of the environment than immersive theatre experiences, often requiring them to dress up as and take on the identity of characters in the film world. These characteristics may sound similar to those found in LARPs; however, in live cinema, participants are not characters, in the sense that the story is not about them, and they have no power in what happens and little influence in the world that surrounds them. They become extras who populate the immersive world and contribute to making it seem alive. Live cinema also works with actors and performers, who are part of the environment to add flavour and authenticity, but who may also serve as guides, engaging participants in certain activities or sending them on activities akin to quest lines, some of which are rewarded with souvenirs or access to certain parts of the experience

(Atkinson and Kennedy, 2015). For example, in *Secret Cinema Presents: Blade Runner* (Secret Cinema, 2018), participants could be arrested, seek out and follow the instructions of a group of rebels, retrieve certain objects, track and interact with actors who played the roles of key characters in the film, and even intervene in certain scenes played out between actors. On the other hand, participants could choose to not go exploring, to ignore all the opportunities for interaction, and instead just sit in a bar or restaurant, socialise, or enjoy the environment without a specific purpose.

The design strategies of immersive theatre and live cinema productions, and the experiences they provide, can be transferred to the design of location-based games, specifically in learning how to make the most of the environment and set design in order to create an immersive and believable world that tells a story from the moment that participants step into it. If looked at through the lens of games, the main mechanic in these experiences is exploration of the world, with the design focused on building a cohesive and immersive environment, weaving a narrative through environmental storytelling as an important but secondary aim to building a place that provides immersion and encourages exploration. Location-based games can incorporate theatrical elements, such as set design techniques and performance from actors, in order to encourage physical engagement, exploration and suspension of disbelief in players. They can also serve as inspirations for how to design sets that embody the themes of the story being told, or the film being shown, as happens with the themes of secrecy and rebellion in Secret Cinema, which were employed in *The Empire Strikes Back* and the *Blade Runner* screenings (Atkinson and Kennedy, 2016). Several museums have experimented with developing or hosting immersive theatre performance. As happens with escape rooms, it is not straightforward to build a bespoke environment in museums, so immersive theatre productions can make use of the existing characteristics of the environment or change it in temporary ways to match the production. An example of this is *Mystery at Frankenstein's Lab* (2018) by Atomic Force Productions, which I analyse in chapter four.

In this section, I introduced some of the elements, mechanics and design strategies that can be found in games, and which contribute toward making an activity or experience increasingly gameful. I go deeper into the choices for using these in subsequent chapters dedicated to the case studies, as I identify the

game elements and design strategies most appropriate to create location-based games that increase motivation and encourage engagement in specific contexts. In each of the design briefs for the case studies, I introduce the game's concept and theme, specify certain rules, game elements and mechanics that need to be present, the types of gameplay actions to be encouraged, and where, when and how the gameplay needs to occur in the museum, subsequently documenting and analysing the gameplay results of that process. As such, this section serves as an introduction to topics that are developed in more detail throughout the rest of the thesis.

Museums as Game Boards: Experience, Engagement and Entertainment

The last section of this chapter is dedicated to analysing museums as places for gameplay, in order to determine the specificities that need to be taken into account when designing games to be incorporated into the visitor experience and as further justification for the use of location-based games as engagement tools in museums. I define motivation and engagement, and how gameplay can result in benefits for museums by providing entertainment, inspiration and knowledge to visitors. In turn, this influences the choice of game elements, mechanics and design strategies to focus on for the case studies. In order to work towards these aims, I start by defining museums as places dedicated to culture which provide opportunities for learning, entertainment and community engagement. I also look at the current status of museums as participatory institutions which use various technologies and strategies to increase motivation, diversify engagement and enhance interpretation, making the case for location-based games as particularly fitting tools for creating diverse choices of engagement for visitors.

Throughout this thesis, I use the term museum to refer to cultural institutions with collections and physical exhibition spaces dedicated to diverse themes, from history and heritage, to art and design, science and natural history, among others. This follows the same logic as applied to my use of the term game: it is of more interest to this investigation to broaden the scope of included institutions, rather than be too strict about what is included and what is not. Moreover, as Falk and Dierking assert while discussing the museum experience, what constitutes a museum in the minds of visitors is more important than following a strict definition (J. H. Falk and Dierking, 2012, p. 25). Nevertheless, in this investigation, I follow the International Council of Museums' definition of a museum:

A non-profit, permanent institution in the service of society and its development, open to the public, which acquires, conserves, researches, communicates and exhibits the tangible and intangible heritage of humanity and its environment for the purposes of education, study and enjoyment. ("ICOM Statutes," 2007)

The last part of this definition, which determines the purposes of museums as both transmitting knowledge and providing enjoyment or entertainment, becomes a guideline for using location-based games for engagement and motivation in museums. In 1946, when ICOM was established, the definition of museums did not include public engagement aims beyond that of putting on exhibitions that were open to the public (ICOM, 2009). This shows an evolution of the concept of museums to no longer be just about collecting, conserving, studying and exhibiting objects and, increasingly, intangible manifestations of culture, but to also focus on education and engagement (Ballantyne and Uzzell, 2011, p. 87). Public museums were created on the understanding that knowledge and culture are matters of public interest, so these institutions make it their mission to inform, educate, inspire and entertain their communities, as well as develop strategies that increase access to their collections, ease of use of their resources, and relatedness of their content (G. F. MacDonald and Alsford, 2010 [1991], p. 73). The use of the word museum in this investigation refers to an institution that collects, cares for and exhibits objects, one which seeks to involve their visitors and the wider community in culture, using different strategies and technologies to create engagement, both on-site and remotely, to support knowledge and education, entertain and inspire.

Whether in response to shifts in society, following a search for their own identity as cultural institutions, or responding to challenges derived from what visitors and funding bodies expect of them, museums have become increasingly participatory institutions (Simon, 2010).¹⁵ They strive to become open and multimodal spaces which appeal to a broad set of people by offering a range of experiences and

¹⁵ The concept of a museum that is defined by its participatory strategies for engagement is systematized by experience designer Nina Simon in her book, *The Participatory Museum* (2010). Participatory museums become platforms for interactive and responsive experiences to which visitors can be active contributors or co-creators. The participatory museum is a response to the need for cultural institutions to become more relevant to their visitors in an increasingly participatory culture, in which the barriers to expression and engagement for everyone involved allows them to contribute meaningfully to shared experiences and connect to each other (Jenkins, Ito, and boyd, 2016).

ways of interacting, often with the help of cutting-edge technology. Museums are expected to fulfil several different roles, from that of informal education institutions, to community centres that foster identity-building and integration, to be environmentally and socially conscious, but politically neutral, drivers of change, to hubs of tourism and economic development. Tracing the history of museums, and their evolution towards becoming more focused on community outreach and engagement, goes beyond the scope of this thesis.¹⁶ For the purposes of this investigation, I analyse the aims of the experiences they provide and how they create engagement with their audiences, to discover how location-based games can have a place in that (see Appendix E for insight into the specific case of RAMM). Taking into account the status of museums as cultural institutions focused on education, study and enjoyment - in other words, learning and entertainment - it is possible to identify and study how museums are currently working towards these aims.

Education has been an important function of museums, particularly public ones, since their creation, but the approach to it and strategies used have changed over time. As places for informal education, museums are expected to cater to the learning needs of different audiences, from engaging with school curricula for young people, to developing courses, talks, presentations and other programs that take into account the different lifelong learning needs of adults (Black, 2005, p. 121; Mayer, 2005). Museum professionals from all departments are now expected to think about and participate in devising learning and meaning-making strategies for the public (J. H. Falk and Dierking, 2012, p. 14). Societal changes in attitude towards pedagogy, with authors such as Dewey and Piaget defending education as 'an active participation of the learner with the environment' (Hein,

¹⁶ The history of museums and their evolution from collection-centred to community-centred institutions has been well documented. For a selection from an extensive body of work related to museums and how they have evolved throughout the years, see Edward P. Alexander's study of the history of museums and the evolution of the museum worker's profession (Alexander and Alexander, 2008 [1979]); Peter Vergo edited the influential book *The New Museology*, which brought together writings from diverse authors, who theorised about the role of museums beyond conservation and classification (Vergo, 1989); Tony Bennett explored the history of museums with a focus on their political and social role as a public institution (Bennett, 1995); Eilean Hooper-Greenhill wrote about the evolution of the museum concept, from the modernist building of the 19th-century to the post-museum, where knowledge is co-constructed with the audience (J. H. Falk and Dierking, 2000); Andrea Witcomb looked at the evolution of museums in relation to popular culture and different audiences (Witcomb, 2002); Graham Black wrote about strategies to create museums that focus on visitor engagement (Black, 2005); Simon J. Knell, Suzanne MacLeod and Sheila Watson wrote about how museums adapt in response to societal changes, and how, in turn, their role and influence in society is transformed (Knell, MacLeod, and Watson, 2007).

1998, p. 6), the adoption of the concept of 'experiential learning' (Black, 2005, p. 133), and a shift from 'content to experience' (Balloffet, Courvoisier, and Lagier, 2014, p. 8), led to the emergence of museums which adopted the concepts of experiential and constructivist learning from the ground up. Science centres, living history museums, children's museums, open-air and ecomuseums, whose exhibits were built to facilitate knowledge acquisition and experience, sometimes eschewing the need for collections, emphasized the importance of interaction and outreach, and of incorporating into the museum cultural works which had previously been neglected due to their immateriality (G. F. MacDonald and Alsford, 2010 [1991], p. 73). In turn, these new paradigms influenced existing institutions. Experiential learning, or learning by engaging the learner in activities that take into account both new knowledge and previous experience, producing a learning cycle that is more focused on process than outcome, translates into an active role for visitors. This emphasises a constructivist perspective for learning in museums, that is, experiences are created on the assumption that individuals construct meaning for themselves using their existing knowledge and create interpretations by interacting with new knowledge (Hein, 1998). This epistemological school of thought positions learning as 'an active process during which the learner constructs knowledge through interaction with the world, through experience' (Hein, 2001, p. 2).

In museums, concepts from experiential and constructivist learning have translated into a variety of interactive and participatory activities, which are presented to visitors as possibilities for engagement alongside more passive presentations of information (Nicholson, 2012a). For example, museums may present physical exhibits which can be observed but also manipulated and interacted with, compounded with further interpretation and information in written form. Many museums use digital technologies, from video, to social media, to virtual environments and games, to complement interpretation and encourage interaction (Roussou, 2010 [2004]). The concepts behind experiential and constructivist learning help legitimise play and games as compatible with knowledge acquisition for visitors, as games are interactive experiences in which players actively make meaningful decisions, apply their knowledge and abilities and acquire new ones to devise new strategies for gameplay. Ultimately, learning by doing can be translated to learning by playing, as gameplay implies interacting

and often engaging in problem-solving and critical thinking (Roussou, 2010 [2004]). This is the rationale behind creating serious games for learning (Gee, 2007 [2003]). However, when creating games with the purpose of educating, there is a danger of leaving behind the aim to create motivating and engaging gameplay. If players feel engaged, motivated and invested in the game, playing in order to be entertained or have fun, they can still learn what is necessary in order to become better at the game.

Despite the importance of learning and knowledge acquisition for museum visitors, as evidenced by the ICOM definition, learning is not the only goal of museums. The definition underscores the goal for museums to be providers of both entertainment and learning, emphasising the importance of audience engagement (Ballantyne and Uzzell, 2011, p. 87) as well as the need to become cornerstones in the support of knowledge in society, while distancing themselves from more formal educational institutions. For this investigation, following my own previous professional experience in museums and the experience I accrued while working with RAMM, I adopt the viewpoint that engagement and the motivation to visit and keep interacting with museums should come first, in order to create entry points for successfully engaging visitors and providing memorable museum experiences that are both entertaining and educational. More than just education, museums are places for encouraging curiosity, self-actualisation, exchange of ideas, and to engage people in various meaningful activities (J. H. Falk and Dierking, 2012, p. 249). With the exception of field trips for schoolchildren, people choose to go to museums in their spare time, with the expectation of having a cultural experience based on artefacts, authenticity, learning, but also entertainment and curiosity (J. H. Falk and Dierking, 2012). The case studies created for this investigation follow this rationale as an aim for designing games and gauging how successful the games created were.

The balance between learning and entertainment can be difficult to achieve, as museums strive to be serious and rigorous enough to be considered educational and trustworthy, but fun and entertaining enough to be considered a quality leisure destination in the minds of their visitors (Black, 2005, p. 81). Museums continue to fight lingering stereotypes that portray them as elitist and stuffy storehouses of a dead past, forbidding and often opaque to the uninitiated (Black, 2012, p. 27), while not veering towards the opposite extreme of trivialising the

experience by becoming too much like amusement parks (Balloffet et al., 2014). While this focus on entertainment may approximate museums to amusement parks in the form of the engagement strategies used, the differences lie in the content and focus: a visit to a museum may be entertaining and fun, but the focus is still on culture, knowledge and meaningful objects. By developing strategies focused on enjoyment and entertainment, as well as education, museums can make the visitors' experience more memorable, creative, personalised and fun, while still adding value through knowledge and authenticity (Balloffet et al., 2014; Black, 2005, p. 81). This is especially important considering the diminishing leisure time available for visitors, as visiting a museum is considered one choice of social, leisure and cultural activity among many. A visit to a museum arises out of a free choice to go on what is usually a casual social and leisure-centred visit (Black, 2005, p. 192), and museums must play to their unique strengths if they wish to compete with other possibilities for their audience's leisure time. Audiences are increasingly discerning, demanding, and most importantly, heterogeneous. Some visitors may want a quiet museum experience, while others expect it to be social; some may be attracted to cutting edge use of technology, while others are content with old-school engagement formats; a given visitor's preferences may change from one visit to another, and preferences may vary within a group as, for example, when grandparents visit with their grandchildren. There is no right or wrong way of experiencing the museum, and museums are expected to offer diverse options with diminishing budgets, increasing demands and challenges for institutions. In summary, it is not a case of museums choosing to focus on learning or entertainment, but of finding a balance between the two that respects the museum's aims and enhances the experiences offered.

This focus on learning and entertainment through process and experience, with objects and knowledge providing an anchor for a diverse and interactive visitor experience, results in a change in expected behaviours from visitors, from an audience who contemplates, interacts in limited ways and passively receives knowledge, to participants who engage actively with the museum to build meaning and experiences, in a relationship that has become increasingly participatory, open, and diversified (Henning, 2006; Reeve and Woollard, 2006). Museums employ strategies such as multimedia storytelling, theatre, drama and

performance, creative practices, hands-on activities, crowdsourced and participatory projects, social media, games, as well as exhibitions, adults-only evenings, sleepovers for children, and workshops, among others, in order to create a dialogue centred on the agency of visitors and a respect for their diversity of preferences, perspectives and approaches (Balloffet et al., 2014, p. 8; Mayer, 2005, p. 360; Wilkinson and Weitkamp, 2016, p. 63). This is mirrored in the way that members of the museum's community are referred to (Reeve and Woollard, 2006). In this thesis, I use the terms visitor and player over audience, the public, or participants, as this investigation focuses on motivating people to visit the museum and enhancing their visiting experience by creating different types of engagement. The term visitor may imply a degree of passivity (Fróes and Walker, 2011, p. 495), as someone who goes to the museum, looks at objects, and moves on, but leaves space for that visit to take many different forms, including that of gameplay. Referring to visitors as players implies engaging in gameplay activity and interactivity, and therefore I use that term when describing and analysing gameplay.

Entertainment and learning, the two aims of the experience that museums create for their communities, are dependent on fostering engagement as well as giving people the motivation to start and continue to engage. Instead of focusing on learning or fun, the case studies in this investigation focus on creating motivation to visit and encouraging engagement from visitors, aiming for the attention, engagement and motivation created to translate into value for visitors, a greater willingness to investigate, question and challenge, and curiosity to discover more. This section is dedicated to defining the terms motivation, engagement, and the museum experience, as well as ascertaining how gameplay can be incorporated into it, and creating guidelines to be applied to design and study games for the case studies.

Motivation, to reiterate what was said in the section dedicated to games, is having energy directed towards carrying out an action. The aim of capturing visitors' motivation is to have it lead to engagement. Engagement is a term that is used in museum studies in relation to audience behaviour, with potentially ambiguous meaning. In this investigation, I use it as a general term to refer to visitors' attention, interest and various interactions with the content in museums. Just as in games, engagement is not an inherently positive, meaningful or memorable

experience, meaning that a visitor can be engaged without enjoying the experience or being enthusiastic about it (Rigby, 2014, p. 117); however, a positive experience in a museum is only possible if visitors are engaged, which is why museums work to encourage and sustain long-term, active engagement (Black, 2012, p. 8). Once the attention and interest of visitors is captured and focused, engagement occurs. In the section of this chapter dedicated to motivation through gameplay, I explored some of the elements and concepts that contribute towards players feeling motivated to engage with a game. In order to understand if and how games can be used to motivate people to visit museums, it is worth understanding why people visit museums, what they hope to get out of a museum experience, and what is unique about that experience that makes people want to engage with a museum, as opposed to engaging in other experiences for learning and entertainment. By identifying what is unique about the museum experience, we can determine how game designers can make use of those characteristics to create games that develop those strengths and enhance the experience.

Museums may struggle to stay relevant at a time when knowledge is easily accessible through the internet, and when there are so many other entertainment options that can draw on considerably more resources than museums, such as videogames, film, theme parks, and television. This leads us to another reason it is important for museums to devise ways to motivate people to visit them: the relevance of visitor numbers. Publicly funded institutions, as is the case of many museums in the United Kingdom, are often under pressure from funding bodies to increase visitor numbers, revenues, and other quantitative indicators, in order to illustrate their relevance and sustainability. While qualitative goals such as supporting educational goals, helping to build a sense of identity and belonging, connecting visitors to their heritage, and creating opportunities for social connections are at the centre of their missions, they require museums to first attract visitors to the museum.¹⁷ In order to apply to new sources of funding, or even to justify their existence in the midst of economic austerity, museums need to be creative in exploring strategies for audience building and engagement, as

¹⁷ Current concerns over the future of museums in the specific context of the UK, especially regarding local authority museums, arise from austerity measures and related budget cuts, as well as uncertainty following the possibility of the country exiting the European Union (A. Brown, 2017).

well as to create revenue, while still staying true to their core missions. Regarding this issue, games cannot be considered a magic bullet; in fact, any strategy that involves digital technologies has the potential to increase the pressure upon the museum's resources. However, it is possible to engage in game design without exhausting the museum's resources. Every museum has existing assets that can be adapted into gameful experiences. Game design can be a way to infuse new life into existing museum resources, digital and otherwise, by using game elements to make them more playful and engaging.

Museums use various strategies and technologies to attract new visitors and encourage existing ones. As there is no one method of communication and interpretation that is perfect for every visitor at all times, a combination of interpretive materials are used to accommodate different types of learners with different needs. This ranges from labels, to expository panels, video, interactive screens, multimedia exhibits, apps, self-guided and guided tours, and so on. Digital technologies have also been adopted by museums in an effort to respond to this challenge, in what is now a widely accepted and expected practice.¹⁸ Although not exclusively digital, participatory practices in museums have been enabled by the use of digital technologies, such as the internet, social media, computers, tablets, and others, which have facilitated the inclusion of a myriad of voices, contributions, and perspectives into the museum that would not have been possible otherwise. In relation to exhibitions, digital media are used to create immersive, experiential, interactive, dynamic and story-driven exhibits, through the use of animation, videos, sound and lights effects, virtual reality, games, and so on, enhancing the experience and helping to build a story around them (Müller, 2010 [2002], p. 297; Stogner, 2009, p. 386).

Digital technologies can also help museums be more flexible in responding to the different needs of their audience, as they can be changed and tweaked at a lower cost compared to changing physical exhibits and spaces.¹⁹ The novelty of interacting with new technologies or experiences may also be of benefit in

¹⁸ Ross Parry has written extensively about the use of digital technologies in museums (Parry, 2010), while Graham Black has studied the transformation of museums using twenty-first century technologies and media (Black, 2012).

¹⁹ Digital technologies have also allowed museums to expand beyond their physical spaces. Museums offer websites that host digitised collections, extensive information, virtual visits, games, and much more, and many have created digital tools and applications that take their collection objects outside the museum or bring the outside world into the museum.

attracting visitors, at least initially. However, in the long term, media alone does not bring visitors to a museum: if people just want to play a game, for example, they can do so elsewhere (Thomas, 1998). However, it is possible that the prospect of interacting with digital technologies, while engaging with objects of cultural interest, is more exciting to some visitors than simply looking at those objects (Mintz, 1998; Stogner, 2009). Technologies are tools that can be used in various ways while keeping the focus on the museum content, its collection objects and stories (Wyman, Smith, Meyers, and Godfrey, 2011, p. 465). This lesson is true for games and any other new technologies that may be adopted in the future.

When it comes to the issue of museums facing competition from other entertainment sources, with members of the audience having more options to choose from to fill their diminishing leisure time, games have several advantages. Videogames are particularly popular among children and young adults under 25 years of age, a generation of players that were born into a world where games were already ubiquitous (Doran, Boyce, Hicks, Payton, and Barnes, 2012). Nevertheless, games appeal to all ages. According to the Entertainment Software Association's 2016 report on the computer and games industries, which gathered data from more than 4000 American households, the average gamer is 35 years-old, with the greatest represented age group being 18-35 years (ESA, 2016). In the UK, it is estimated that half the population plays videogames, with the age group between 6 and 10 years-old, of which 74% play games, being the most represented, according to a fact sheet by the Association for UK Interactive Entertainment (UKIE, 2017). This means that museums which adopt games can potentially attract audiences of all ages, with a specific focus on young people who may not necessarily have the habit of visiting museums for leisure, but who are attracted to playing games.

Game players frequently play games with friends and family members, suggesting that for them gaming has an important social component, which can also be tapped into by museums, which are often a social occasion with groups of friends and family visiting. If museums incorporate games as strategies for engaging young people's curiosity and interest, it potentially enhances the museum's reputation as a place for both entertainment and learning, with the added bonus of the institution using the kind of language, tools and channels

which its young audience is already familiar with in their daily lives. Engaging young people is especially important for museums as they represent the next generation of potential museum visitors and patrons. If, from a young age, they recognise the value of museums and make a habit of visiting, they may continue to do so throughout their lives, bringing their friends and family with them and later passing on the habit to their own children.

The term 'museum experience' is used in this investigation to refer to the activities that a visitor embarks on while engaging with the museum content, as well as the museum components included in those activities, whose characteristics influence the types of interactions that visitors can have. These components, which can be found in most museums, include the museum's building and architecture, the exhibits, the objects in the collection, the staff, the shop, the café or restaurant, the tours, the website, among other possibilities.²⁰ However, a museum experience is more than the sum of these parts. The unique strengths of the museum experience derive from the aims of the museum, and in how it gives visitors the opportunity to participate in solo or social activities that combine learning, entertainment, heritage, and identity into a common experience grounded in the museum's collection, comprised of historical and unique objects that have an aura of history. Information and knowledge from the museum, while valuable, is often available online for virtual visitors to peruse, but the complete sensorial, intellectual and emotional experience of visiting a museum, combining the physical destination, the social environment, and original sources of trustworthy and high-quality information, cannot currently be replicated in any media (Wyman et al., 2011). Visitors to museums choose to engage with this unique combination of education and entertainment, expecting an experience in which they learn something, but which also gives them the opportunity to enjoy themselves (Black, 2005, p. 192). All of this is done in the presence of objects that have been carefully chosen, conserved and displayed, in order to tell a story about those objects and the museum itself. Being physically in the presence of those objects is a unique part of the museum experience. Moreover, each museum has its own physical site, collection, mission, origins, and stories to tell,

²⁰ The list of common components between different museums is informed by Falk and Dierking's strategy of studying the museum experience by separating it into more or less distinct but interconnected components (J. H. Falk and Dierking, 2012).

and therefore the museum experience is dependent on the characteristics and configurations of the museum's architecture, galleries, exhibits and collections.

Most importantly, for this investigation, I consider the museum experience during a visit to always imply three basic components: a tour, or the movement of the visitor around the museum; the objects in the collection and on show; and the physical space of exhibition galleries. These components exemplify the location-based nature of a visit to the museum, as they are unique to each institution, which is why the games created as case studies for this investigation are built around these components. All three are implicated in every single game created, to a certain extent: all the games require the players to move around the museum in a guided way, encourage players to interact with objects, and ask players to physically move around in the galleries. However, the focus of each chapter is in each of these components in turn: chapter two explores strategies for making the tour gameful, chapter three focuses on the collection objects, and chapter four on the exhibition galleries. These components combine into an experience that is unique to museums and will be incorporated into the game design processes detailed in the remainder of this investigation.

The purpose of this chapter is to give an introduction to the concepts and strategies from game design and museum studies that are applied and analysed throughout the thesis. In the chapters that follow, I engage in the application of the design guidelines devised in this chapter, with the addition of specific game elements and strategies, and the analysis of the resulting gameplay experience. The following chapters are organised around the three major components of the museum experience identified in this chapter, the tour, the collection objects, and the exhibition galleries, incorporating them into the design of location-based games, with the use of game elements, mechanics and design strategies that I identify as having possible affinities to those components. Rather than being restricted to certain categories of games, I look at different game design possibilities for these components and their effects on the museum experience. In each chapter, I study past examples of games in museums, engage in a first-person gameplay analysis of current examples, and finally, apply the resulting design lessons into the creation of a case study, the gameplay of which is then documented and analysed. During the analysis of the gameplay experience, I seek to understand what motivated players to visit the museum, to engage with

the game, how they engaged with it, how they engaged with other players, how they experienced the museum and its contents, how they felt while doing it, and how game design influenced these effects. This data informs the development of the location-based game design framework for museums.

This chapter was also meant to identify the reasons why games have potential as engagement tools for museums. Museums have already started to use games as tools to attract new and existing visitors, both to visit the space and to interact online, to build a stronger brand, to encourage learning and interpretation, to encourage looking at objects in different ways, and to foster engagement (Beale, 2011, p. 15). Talking about analogies between museums and games, game theorist Tom Chatfield highlighted that a visit to a museum, just as playing a game, is 'as much its own reward as the means to an end – something that can be moving, delightful, enthralling, revelatory, beautiful, informative, or simply a transporting escape from the quotidian' (Chatfield, 2011, p. 481). Games can be developed to create motivation to visit, to initiate and sustain engagement, to diversify the types of experiences available to visitors, and to foster entertainment and learning. By creating location-based games for museums, the aims are to capture the attention and curiosity of visitors, both new and existing; engage visitors in different and positive ways; and sustain that engagement, making sure that it gives them motivation to come back to the museum. Gameplay has the potential to make visitors feel comfortable and confident in their ability to engage, to challenge and empower them, and to create space and opportunities for social relatedness (Nicholson, 2012a). By making games that are location-based, game designers can focus on what is unique about the museum experience, and use different game elements and design strategies to complement and enhance that experience. These concepts, strategies, and aims serve as guidelines for the rest of this investigation.

Chapter Two: The Quest and the Museum Tour

This chapter is the first in this thesis dedicated to the practical study of implementing location-based game design in museums, as a player and as a games designer, by incorporating different components of the museum experience into the game design process in order to determine the effects of the resulting experiences on visitors' motivation and engagement. The component of the museum experience in consideration in this chapter is the visitor's tour, that is, the path that visitors follow throughout the museum and at times beyond the space of the museum to engage with the institution's content. I propose structuring this tour in the form of a quest, with start and end points, a goal, as well as a treasure hunt in the form of challenges along the way, giving players a structured visit with purpose and activities to engage in. In terms of putting location-based game design into practice, this chapter details the simplest strategy studied in this investigation. Namely, I build upon existing non-gameful resources in order to transform a museum tour into a quest. The lessons learned here led me to the decision to collaborate with other game makers and use different technologies to create bolder and more complex experiences. Subsequent case studies and strategies developed in this investigation represent a gradual increase in the complexity of experiences as I build upon existing knowledge and practice, culminating in the location-based game design framework for museums.

From trails, to treasure hunts, to guided tours, to audio or mobile app guides, many of the visitor activities that exist in museums are built around the idea of adding structure to the tour, with the aim of enhancing the visitor's journey through the museum. These journeys can be built around a theme or event, or be based around a narrative, as museums are increasingly seen as places for multimedia storytelling practices created around objects (Wyman et al., 2011). Digital technologies are often used to support visitors in their tours, taking the form of mobile applications, websites that guide or encourage personalized exploration, self-guided tours built around trails, audio guides, multimedia guides, or apps that encourage social connection while visiting the museum. The wealth of pre-existing digital platforms that support tours, coupled with the keenness of museums to build upon existing resources gives rise to the possibility of using

those platforms and structures as part of the game design process analysed and developed in this chapter.

Quests make use of the space in the game world as background to create a physical as well as an intellectual journey, involving challenges that require skill to be completed. In games, quests may be a vehicle for the game's storytelling, enabling roleplay by giving players an action-driven context for the story. The completion of quests may give players external rewards, such as items or improved abilities, or a sense of pride and accomplishment upon the skilful completion of a task. It is possible to identify parallels between the quest and the museum tour. Quests tend to feature in narrative-driven games that put the player in the central role of the hero, such as role-playing games (Whitton, 2010, p. 57). In games, quests usually have an end goal: a quantifiable outcome and clear winning condition (Salen and Zimmerman, 2003, p. 258), and may incorporate several sub-goals. While the museum tour cannot be said to have quantifiable outcomes or win conditions, it does have a general goal, which is for visitors to visit and travel through the museum in a way that fulfils their expectations. Like tours, quests imply movement through space, can be self-guided or guided by others, involve free choice, but also taking participants on a constricted, predetermined path, can involve storytelling or be solely action-driven, and give players challenges to complete.

In this chapter, I begin by determining the gameful potential of the museum tour through the study of past and existing examples of structure given to them, and analysing the most appropriate game elements and mechanics to apply to the tour; namely the quest, a physical journey, challenges and treasure hunts. As a player-researcher, I then select and study examples of past location-based gameful tour experiences in museums, including RAMM's *Ghostwriter* (Blast Theory, 2011), a gameful audio tour of the then newly-open galleries, and *Treasure Hunters* (Aardman, 2018), an app-based treasure hunt experience built for the Science Museum in London. I then design and develop the case study for this chapter, *The Great Exeter Garden Quest*, an app-based gameful trail with challenges inspired by and linked to the exhibition *International Garden Photographer of the Year 9*, which opened in RAMM in April 2016. I build upon an existing digital platform, Exeter Time Trail, to create a location-based quest that allows players to discover the city and its connections to the museum's

collection, and also encourage them to engage with the exhibition's theme in a creative way. After detailing the design and development process, I discuss the results in terms of how effective it was in increasing motivation and engagement with the exhibition.

Incorporating the Museum Visit into the Player's Journey

In this section, I determine how to incorporate the museum tour into the process of designing location-based games by analysing the strategies and platforms that museums use to help visitors structure those tours, and recognising the parallels they have with game elements and mechanics. Specifically, I identify how tours can be structured and guided with the help of trails, treasure hunts, audio guides, mobile apps, and other tour-based museum experiences, and how game design can apply a quest structure and its associated game elements of storytelling, goals, rewards, roleplaying, challenges, and navigation of space, to enhance those tours. While it would be impractical to attempt to describe and explore every single variation of these experiences, I have selected examples that are illustrative of the ways that museums have used digital technologies to build upon the concept of the tour experience to provide a limited, but varied snapshot of the possibilities for transforming the visitor's tour. I then delve into the concept of quests, their use in games, and antecedents of the application of a quest structure to experiences that take place in real-world spatial settings, and which inform the design of these experiences in the space of the museum. These conclusions inform my analysis of such experiences as a player-researcher, and the design of the case study at RAMM, both detailed later in this chapter.

The Museum Tour

During a visit to the physical space of a museum, the visitor's tour around that space as they navigate to find content to engage with is one of the most basic observable activities. The tour can be free and unguided, or structured by guides. As visitors walk around the space they can choose their path with purpose, or wander without a predefined aim; stop to look at certain objects, or quickly skim over the exhibits. Over the years, museums have developed various strategies to help guide visitors through their physical spaces and the content therein. The most visible way that museums structure visits is through the physical arrangement of their galleries and the objects displayed therein, which usually

follows an internal logic devised by the curatorial staff, exhibition designers and architects. Galleries incorporate cues such as arrows, numbered rooms or displays, corridors, and lighting, that give visitors pointers in possible directions for their visit, without restricting their movements or hampering their ability to choose where to go next. The act of physically moving through gallery space involves creating a connection to that environment (Oddey, 2009, p. 133). As visitors explore the museum, they may find and create connections between objects, memories, and ideas through their visit, guided more by serendipity than any existing arrangement. The simplest way to visit the museum is, therefore, an informally structured walk.

Trails are formed when a basic structure is added to these unguided walks. A trail is a path through physical space that follows some kind of structure, which can range from accessibility, such as a trail that leads across a forest, to routes organised around a selection of thematically relevant places. Trails do not necessarily involve the use of digital technologies, but these may be used to enhance and further guide the experience. In museums, trails build upon the idea of the tour and seek to structure it through the creation of a physical journey that usually follows a specific theme. They can be confined to the inside of the museum or take people outside, to the spaces surrounding the institution. The themes they follow are generally grounded in the collection or architecture of the museum. Besides giving visitors a more structured way of exploring the museum, trails also add a degree of personalisation, as they allow visitors to choose to go to certain places or see certain things according to their personal interests and preferences. As part of the Exeter Time Trail project, created in partnership with RAMM, and which I analyse later in this chapter, trails have been extensively studied by Giannachi et al as tools for creating connections and supporting knowledge acquisition in heritage, supported by concepts of mapping, cartography and personalization (Giannachi et al., 2014, pp. 110-111). Trails are an effective way of structuring a museum visit since they are cheap to create and do not require any additional resources from museum staff, in addition to creativity, imagination and lateral thinking (Black, 2012, p. 179). They can also be tailored to visitors with different characteristics and needs. Trails for children, for example, may involve activities such as drawing, touching, and finding, which engage them with the content, promoting learning while also fostering their

creativity. When museum trails involve finding objects and completing actions, they can be more accurately described as treasure hunts. Trails can take the form of simple paper guides or more complex guides that make use of digital technologies.

Various museums have created trails for visitors. An example is the online platform *I Like Museums*. Created by a group of museums in North East England, it is a repository of thematic trails based on the interests and preferences of visitors, who can use the website to create and share their own trails (Simon, 2010, p. 36). Trails range from the more conventional, such as *I Like Romans*, which takes visitors to places such as Hadrian's Wall, the Corbridge Roman Site and the Museum of Archaeology in Durham, to the more whimsical and unusual, such as *I Like Beer*, which directs visitors to the best pubs located near museums. The Tate Modern followed a similar concept in 2006 when creating pamphlets with different tours of the museum, which followed the theme of emotions and moods. For example, visitors could pick the *I've just split up* tour, which would take them on a journey following the theme of heart-break (ibid), creating structured, playful and personal ways to experience the museum. Trails sometimes include challenges: for example, the Victoria and Albert Museum in London created digital trails targeted at young students that encouraged them to engage in what could be considered unconventional behaviour in a museum: for example, they were 'prompted to laugh out loud in order to gauge other visitors' reactions; to imagine conversations between the subjects of a painting; to secretly photograph other visitors' ankles in front of a Tudor-era bed; to write messages to other visitors', among other challenges (Fróes and Walker, 2011, p. 489). Such activities were encouraged alongside guiding visitors towards specific objects, prompting participants to engage with them in different ways. The trails served to activate the space of the museum and encouraged visitors to change their perspective and experiences by engaging in ways they would not necessarily do unprompted. In short, trails can be described as thematic ways to structure the navigation of space, which may include actions and challenges to be completed.

Another strategy that museums have employed to give visitors more structured visits is through the creation of audio-guides. Audio-guides are recorded soundscapes, consisting of spoken commentary interspersed with evocative environmental sounds. These experiences use sound to augment the physical

space, and add interpretation to the objects on display by providing information and context. The format of the experience can vary: they may guide visitors on an organised, linear tour of the space, perhaps using location-aware technologies such as Bluetooth beacons or GPS to detect the user's location and proximity to certain places, or they may allow visitors to choose which object on display they would like to know more about, by inputting a code or number which identifies that object in the guide. These guides use headphones connected to handheld devices, which belong to the museum and are temporarily given to visitors, or use the visitors' own mobile technologies, if the audio-guide has been made into a downloadable mobile application. Using audio and headphones has the characteristic of isolating the visitor from the rest of the environment, and possibly from others around them (Bandelli, 2010 [1999], p. 150). The audio guide can be thought of as a soundtrack to the museum experience, or as a film script of the tour, since by guiding the attention of listeners to certain objects or details, they guide visitors' eyes towards specific content (J. R. Christensen, 2011, p. 19), besides guiding their movement as they navigate through the space (Fisher, 1999). Audio-guides can also be used to communicate a narrative to the visitor. Beyond information, these narratives can include storytelling that involves fiction and imagination. The human voice visitors listen to may be neutral and authoritative, or engaging and personal.

Examples of knowledge transmission include the guides in the British Museum. The British Museum first created an audio guide in the 1980s, and recently created a mobile-based audio guide that can be tailored according to visitor preferences to include pre-existing interests and time available to visit the museum (Mannion, Sabiescu, and Robinson, 2015). Other museums try more experimental formats and experiences. The traditional format has been experimented with by artists, whose work expands the concept of audio-guide, as is the case of *Ghostwriter* (2011) by Blast Theory, which is analysed later in this chapter. Janet Cardiff is another artist that explores the evocative potential of audio-guides (Fisher, 1999). Her audio walks add a digital, fictional layer to physical environments, using mobility and communication to create a transitory hybrid space for the people following the guides (Benford and Giannachi, 2011). Audio can be incorporated into the design of games in order to augment the space and create a hybrid reality.

Mobile applications and online platforms of various types have been developed by museums, with many providing visitors with different ways of structuring their tour. These platforms provide guidance and information, and often ask visitors to contribute their own content, such as photographs, text and audio, or to tag objects with keywords or locations. An example is *Art Maps*. A collaboration between Tate, RCUK, Horizon, and the University of Exeter, *Art Maps* aims to 'creat[e] engagement through the spatial interpretation of art' (Coughlan et al., 2015, p. 407). The platform asks contributors to create links between artworks in Tate's collection and locations in the physical world, thereby generating crowdsourced maps with 'holistic "footprints" for artworks' (ibid). By encouraging its users to navigate across physical space, exploring historical locations and investigating possible associations to find the best geotags to add to artworks, *Art Maps* takes both visitors and the collection out of the museum and to the outside world, thereby expanding the space of the museum. The resulting hybrid space is created through 'the juxtaposition of the collection, experienced digitally, with physical environments from the user's everyday life, practiced physically, in space' (Giannachi et al., 2015, p. 8). While it cannot be described as a game, *Art Maps* is an example of how to use digital technologies to guide and enhance the museum tour, helping visitors navigate the space, prompting them to engage with the content in deeper ways, and giving them challenges to complete by making their own contributions towards the knowledge and media surrounding objects. By taking advantage of an online connection and other capabilities of mobile phones, the tour can be personalised, expanded in time and space, and incorporate contributions from visitors.

The Tour and Game Design

From this snapshot of tour experiences in museums, which were built to enhance the visitor's experience while touring through museums, their physical galleries and surrounding spaces, including urban environments and beyond, it is possible to draw conclusions that are useful for this investigation. All the experiences mentioned are self-guided, a conscious choice derived from the fact that, compared to tours guided by other human beings, self-guided tours offer more agency to visitors in deciding how to navigate the space and what to do next. These experiences structure the tour and facilitate new types of spatial engagement with the museum content by guiding visitors towards certain places

or objects, and structuring their activities by offering them challenges to complete. The space may be broadened to include not only the physical space of the museum, but places beyond the museum that are related to the content exhibited. While they do not necessarily require digital technologies, the addition of digital enhancement creates a hybrid space, comprised of the physical world and a virtual layer which visitors navigate. Some of these characteristics, particularly the guidance of space navigation and the challenges, approximate self-guided tours to treasure hunts, and with the addition of a start and end point, to quests. Through the use of game design strategies, by adding challenges, goals and other elements, these parallels can be enhanced, and the resulting experiences become gameful.

Quests are collections of challenges and activities that guide players through instructions and objectives. In games that follow a story, as is the case in role-playing games, the quest structure has been adopted as a storytelling mechanism from earlier narrative-based media, such as literature. The origins of quests can be found in oral storytelling, mythologies and literature. Quests have been part of dramatic stories for millennia, often in recurring patterns of storytelling mechanisms, plot structure, and character development, as evidenced by Joseph Campbell's classic work *The Hero with a Thousand Faces* (Campbell, 1968). In this book, Campbell explores myths from different cultures, developing and explaining his theory that hero stories are versions of a single, universal archetype. He traces the reoccurrence of the quest structure in fiction, interpreting it as a journey that is not only spatial, but also intellectual and emotional, during which the hero must answer a call, meet mentors and allies, go through trials, face enemies, triumph in a final battle, and return home with something to offer to the community, all while experiencing personal growth on the way to the goal (ibid). The quest, or the hero's journey, becomes a three-act model, with a call, a journey, and the return, for all human experience (Tosca, 2003). This structure can be found in all storytelling media, from books, to film, to television series, and most recently, in games.

In games, a quest can be defined as 'a journey across a symbolic, fantastic landscape in which a protagonist or player collects objects and talks to characters in order to overcome challenges and achieve a meaningful goal' (Howard, 2008, p. xi). There are many possible types of quests. Depending on the gameplay they

want to create, quests are ways for game designers to encourage players to explore and interact with the game world, assume a role within that world, and move the narrative forward. Unlike in literature and other storytelling media, where readers and audiences follow the heroes along on their journeys, in games, players are put in the role of the protagonist. They are the ones responsible for answering the call to adventure, going on the journey of transformation, completing the challenges, and returning as victors. In other words, in books, one reads about quests, while in games, one performs them (Tavinor, 2009, p. 5).

Quests were incorporated into pen and paper role-playing games, which owed many of their settings to the fantasy writing of J.R.R. Tolkien, who was himself influenced by medieval epic poems and works of mythology, such as *Beowulf* and Nordic sagas (Tavinor, 2009, p. 122). Pen and paper role-playing games were subsequently used as blueprints for the creation of role-playing videogames, and the settings and inspirations carried over to the new medium. The structure of the quest transcends game genres (Ashmore and Nitsche, 2007, p. 504), but tend to be more prevalent when story plays an important role in the game world. Story-driven genres include adventure and role-playing games, in which players take on a different identity within the game world, where they go exploring, solving challenges, and interacting with other characters, both playable and non-playable (Whitton, 2010, p. 59). Quests are particularly prevalent in massively-multiplayer online role-playing games, such as *World of Warcraft* (Blizzard Entertainment, 2004), where they, and the game world they take place in, are revealed to players according to their character's level, and can therefore be seen as 'quests of personal growth as well as spatial expansion' (Ashmore and Nitsche, 2007, p. 504). Quests usually include a narrative setting, a space that must be explored, challenges, often in a set order, and one or more goals (Ashmore and Nitsche, 2007). Specific characteristics of quests can vary, from basic escorting or fetching quests, to epic journeys traversing the entire game world. Quests in games are often used as tools for narrative and spatial progression, giving the player goals and actions to carry out, while at the same time providing context and meaning for those actions. In short, they are a way to structure both content and context in games.

Quests can be seen as a game structure that contains other game elements, including a story, goals, rewards, roleplay, challenges, and navigation. The ways in which a story can be incorporated into quests bring us to the differences between games of progression, with a constricted storyline and set of actions, versus games of emergence, in which more freedom and agency is given to players to determine what happens within the game (Juul, 2005). Not all games tell stories, but in games with story-driven quests, players gradually discover the underlying narrative over which they have limited influence, although some games present players with choices that change the narrative's development to an extent (Tavinor, 2009, p. 123). Since quests can be found more often in games of progression, which follow a linear narrative structure, they usually involve steps that have to be followed in a fixed order. In contrast, games of emergence, such as sandbox, simulation or complex roleplaying games, allow players more influence in how the game develops, by accommodating unexpected actions and allowing them to follow their own goals or choose what happens in the story. As a non-digital example of games with an emergent narrative, the *Choose Your Own Adventure* books, which first appeared in 1976, allow players to choose between several branching options of where to take the narrative, influencing their experience of the game world and the outcomes of the story (Salter, 2014, p. 15). Stories may be spatial, that is, defined by goals and conflicts that are dependent on the movement of players through the game environment (Jenkins, 2007, p. 58), a concept which I explore and develop in chapter four. On the other hand, quests can be action-driven instead of story-driven, meaning that the most important part is using abilities to explore, fulfil challenges and complete the quest, rather than telling a story. Stories, when present, serve as frames for gameplay, giving context to the challenges that players are asked to carry out. In short, quests can be used to communicate content and create context, as a storytelling device, or place greater emphasis on action, challenges and exploration, rather than storytelling.

More than telling players where to go, quests also give them something to do. Challenges in quests may include exploring locations, finding clues, solving puzzles, creating an artefact, talking to someone, and other activities that take on meaning within the context of the game world (Flanagan, 2014, p. 266). Designing a quest that supports certain actions and not others restricts the

freedom of players, but it also prompts them to carry out actions that they might not have a reason to engage in otherwise. The difficulty of challenges in a quest can be scaffolded, starting with easy actions, and becoming progressively more challenging as players develop their abilities. In terms of game design strategies, this can be done by creating bonus challenges or levels for players who want a more difficult challenge, making them optional for players who want an easier time. Although challenges do not necessarily have to, they may involve players creating content. These actions may require players to engage in light roleplay, that is, to assume a role for themselves within the game that is defined by the actions they must fulfil as part of the challenges. While roleplaying is not necessarily important in action-driven quests, as opposed to story-driven, players are nevertheless given the role of the protagonist, acquiring a perspective and behaviours that can be different from their own.

Quests usually have an end goal, or several goals, which can be completing the quest, and therefore achieving the winning state of the game, or something more concrete, such as finding a location or acquiring an object. However, in quests, the journey is more important than the destination. Progressing and completing the challenges can be rewards unto themselves, and offering tangible rewards as goals does not necessarily add to the intrinsic motivation of players. As I have shown in chapter one, intrinsic motivation is linked to experiential elements such as flow, competence, autonomy and relatedness, and not necessarily to more tangible rewards (Ryan and Deci, 2000). If external rewards are included as part of the quest, they should be there in addition to intrinsic goals, such as acquiring knowledge, developing abilities, discovering a story, or socialising. As quests are experiences that are limited in time, if a quest is a one-off experience then offering a reward will most likely not be harmful for sustainable, long-term engagement, which is the end goal of museums (Rigby, 2014). However, if quests are part of a longer-term experience, such as a full-fledged game with several quests, the priority should be to rely on the satisfaction of being able to respond to challenges, exploring new places, and to be creative, among other possibilities. Instead of giving players a badge for completing a quest, for example, the system may reward them with unlocking access to further quests, levels or challenges. The emphasis should be on the experience itself, not on its end goal or reward.

A quest implies sending players on a journey, which is physical as well as emotional and intellectual. This means that players navigate the space of the game world, which can be purely virtual, or in the case of location-based games, physical or hybrid. Some quests are motivated by the exploration of a space. This exploration is intrinsically rewarding, as evidenced by the fact that some games are entirely based around this mechanic. Examples include walking simulators such as *Firewatch* (Campo Santo, 2016), in which players control the story's protagonist in exploring the game world and discovering information that advances the story. When it comes to movement through space, quests in games may offer players directions, or a map to help them navigate between locations and challenges. Maps may include specific locations that the player must visit, objects to be found in those locations, the main path to be followed, enemies and allies, to name a few possibilities. They may be objective or illustrative of not only where players need to go, but also what is important within the game world (Flanagan and Nissenbaum, 2014, p. 67). In some games, the parts of the game world that the player has not explored yet are often hidden, in a mechanism that has been named 'fog of war', which originated in early strategy, often war-themed games (LeBlanc, 2006). The gradual clearance of this fog is meant to enhance the sense of discovery derived from the player moving around in that world. In terms of location-based game design, for games taking place in the physical world, the exclusive use of subjective maps would not be practical or desirable, as there is danger of players getting lost. While this danger can never be completely cleared, it can be minimized if players use more objective navigational tools such as Google Maps. Many location-based games use technologies such as GPS to determine the player's location in the world and give directions accordingly. If game designers wish to offer players an evocative map, it is advisable to also include a more utilitarian one, or to design it in such a way that it does not obscure essential information. Navigating and exploring the game world and discovering new locations are motivating activities for players, especially if the gameplay takes place in the physical world.

Quests are common in videogames, but also in pervasive games such as live-action roleplaying games, about which I go into more detail in chapter four. There are antecedents to the use of the quest as a structure for experiences in the physical world, which can be of interest to designers of location-based games.

Questing, a pastime popular in the United States of America, consists of a network of treasure hunts created in the real-world. Quest creators hide a box with a custom-designed rubber stamp, art supplies, and printed materials somewhere in the world. They then write poetic clues in rhyming verse, often drawing from local stories, characters, or phenomena for inspiration, and design maps to guide players through the environment, resulting in experiences that are often educational as well as entertaining (Clark and Glazer, 2004). Questing developed from an older tradition called letterboxing, which originated in England in the Dartmoor region in 1854, in which weatherproof boxes are hidden throughout the real-world, and which combines navigation, creative expression and puzzle-solving (Clark and Glazer, 2004, p. 17). Over the years, as additional players began to take up the hobby, they became more organised and sophisticated, creating maps that tracked the locations of boxes, and leaving handmade stamps for others to find. Some of these strategies were directly transferred to questing. The process of creating such a quest requires developing a sense of place, understanding the history of that place, the members of its community, and how the story that emerges can be effectively transformed into a series of puzzles communicated to players through verse. Geocaching is a similar activity which has the particularity of being based on the use of GPS-enabled devices. These activities structure the exploration of physical space through the use of storytelling, treasure hunts, puzzle-solving, and goals.

When creating a quest, the game designer devises a set of rules and instructions that specify the order of events, the general movement of players through space, their goals, and the actions they engage in (Tosca, 2003). Adding structure and guidance to a tour or physical journey by shaping it into the format of a quest restricts the actions and choices of participants, but gives them agency within those restrictions. Game designers can create the context for gameplay by encouraging certain kinds of actions and restricting others, but they cannot directly control how players then act within the game world. Even in closed structures such as quests, players still have agency to be able to create their own paths. For example, they may choose to stop doing a quest to further explore a location, skip one or more challenges, complete a challenge in a way that, while adhering to the rules, was not intended or anticipated by designers, create their own unofficial challenges and add them to the experience, or take different paths

towards a destination than those recommended by the quest. As such, it can be concluded that quests are a strategy to create journeys with a predetermined trajectory, while still affording players the sense of agency and meaningful choice, allowing them to create their own path.

In this section, I presented strategies that museums use to enhance the visitors' tour, by structuring and shaping it through formats such as trails, audio-guides and online platforms. I identified the parallels between a structured museum tour and quests, namely the fact that both require navigating space, following a path, and completing challenges that require skill. By adding a quest structure to the museum visit, we encourage players to visit places, see objects, and engage in activities they may not have engaged in otherwise. The next section is dedicated to the analysis of existing and past experiences of gameful tours in museums, including my perspective as a player-researcher of a mobile app which structures the museum tour into a self-guided treasure hunt. The section after that details the design, development and gameplay of the location-based gameful tour I created for RAMM as part of this investigation.

Key Examples: *Ghostwriter* (2011) by Blast Theory, *The Hidden Museum* (2016) by Aardman, the University of Bristol, and the Bristol Museum, Rufford Abbey Sculpture Trail (2013)

In this section, I analyse a selection of experiences in museums that have adopted a quest-based structure to enhance the visitor's tour. The choice of games included follows the criteria established in the methodology for this investigation, which is to focus on experiences created for public museums in the United Kingdom and which exemplify different applications of the game design strategies considered. These examples are meant to provide an overview of the experiences and related strategies currently being adopted by museums, from which can be drawn conclusions that can be adapted to the purposes of this investigation. Examples of these experiences include *Ghostwriter* (Blast Theory, 2011), a gameful audio tour created by the artist group Blast Theory for RAMM,²¹ *The Hidden Museum* (Aardman, 2016), a mobile app developed for Bristol

²¹ As part of this investigation, I had the opportunity to attend a research residency with Blast Theory, in their Brighton studio, in order to analyse their archival material, interview the artists, and observe their working process. I accessed most of the information regarding *Ghostwriter* from their archives.

Museum & Art Gallery by Aardman and the University of Bristol, which allows visitors with hand-held digital devices to play location-specific games through the use of iBeacons, small Bluetooth devices that locate and help players navigate the museum building, and the Rufford Abbey sculpture trail, which structures the visitor's tour as a gameful trail.

Developed by Brighton-based artist group Blast Theory, who I introduced in chapter one, *Ghostwriter* (Blast Theory, 2011) is a location-based audio experience commissioned by RAMM for the opening of its renovated building in 2011. The experience is a mobile phone-based audio guide with a fictional story, narrated by a female character who players can reach by using their mobile phones, or borrowing one from the museum reception, and by dialling a phone number found on a gallery wall. The initial inspiration for the experience was the museum's collection concept and tagline, 'Home to a million thoughts', meaning that the driving force behind the museum's collection and exhibits is 'to stimulate thoughts and ideas, seek opinions and contributions, start conversations and encourage debate' (RAMM, 2011). The artists were inspired by the objects in the museum's collection, and by the personal stories of those who had made or come into contact with those objects, to create a story around the meaning of objects in people's lives.

The story is gradually discovered by players through their own choices of which path to take inside the museum, since different galleries give access to different parts of the story. The story follows a format reminiscent of *Choose Your Own Adventure* game books, in which the narrative moves forward through a branching system dependent on the choices of players. For example, players are told they can continue to the next gallery to hear more about the protagonist's family by pressing one on their keypad, or that they can go to the galleries on the downstairs floor to hear about the protagonist's past, by pressing two. The story follows a path through past and present times, as well as different spaces: at times the narrator describes the galleries that players can see around them, seamlessly transitioning to descriptions of places that the players cannot see, such as the living room of a lost personal home, as if they were currently standing in them, adding an imaginary layer to the real-world through the use of sound and narration.

According to Ju Row Farr of Blast Theory, '*Ghostwriter* is about what it means to interact with history through objects' (J.R. Farr, personal communication, 8 June, 2016). According to Farr, the artists did not want to make an audio-guide based on the objects in the collection and their historical significance. Instead, they opted for an investigation into the personal meanings of objects in people's lives, and how objects can serve as interfaces or portals between different times, and the lives of the people in those times. For example, the narrator mentions a group of flint in the room dedicated to Prehistory, how they were once made and handled by hands 'much like our own', and how their arrangement reminds her of a fleet of alien spaceships. The museum space becomes a stage where past, present and future meet and can be accessed by visitors, who navigate the galleries in search of a personal connection with the museum's space and objects. While the artists were inspired by the format of the audio-guide, they wanted the experience to go beyond it, both thematically, by including concepts and ideas beyond the official interpretation of the museum, and structurally, by making the tour gameful through the provision of a branching narrative and giving visitors agency (J.R. Farr, personal communication, 8 June, 2016).

The story is narrated by an anonymous character. Unlike traditional museum audio guides, this character gives players a personal interpretation of the gallery space and the objects therein, often intertwining them with anecdotes from her life story. The voice gives clues to the locations and times she describes, but these are never explicitly explained to players, leaving them space to interpret the words and put together the pieces of the story. The voice asks players about their own interpretations, promoting a sense of identification with her character and the story, as well as encouraging players to develop personal connections to what they see in the museum. Towards the end of the experience, the voice gives players a challenge: to record a voice message detailing what they have in their pockets, or describe an object that holds special meaning to them. The majority of players who went through the experience left an audio message responding to the challenge, some describing an object with a short sentence, while others talked for a longer time, not just describing an object but also telling the story behind it. One player explained she had a bottle of eye drops in her pocket, as she had just had cataract surgery the day before, and felt like she was seeing the world for the first time; another described a bus card photo of her grandmother,

which she carried in her purse to look at every time she felt she was forgetting what her grandmother's face looked like; another player talked about a fragment of animal bone that she had found in Dartmoor as a child during her first family holiday. This suggests that the experience was successful in reaching the intention of the artists, that of portraying the objects in the museum not as impersonal relics that people are meant to learn about, but as living, breathing entities, that have history but also stories, which tell visitors not only something about the people they used to belong to, but also about themselves (J.R. Farr, personal communication, 8 June, 2016).

Ghostwriter shows how museum tour experiences can be made gameful by adopting a quest structure through the use of audio narration, with a branching narrative inspired by *Choose Your Own Adventure* books. Players used their own devices, which they were already familiar with, to follow the experience at their own pace, giving them agency and control over their path through the museum. This follows the rationale that it is preferable to build experiences that use the technologies that visitors already have and are familiar with, which helps to lower barriers to entry and means that visitors can dive straight into the experience, instead of having to learn how the technology works. Nevertheless, since not all visitors have these technologies, it is advisable to have a few devices available for visitors to borrow. The experience is akin to a quest as it has a start and end point, a story, navigation through space, agency, and a final challenge. This format allowed the artists to give participants meaningful choice regarding where they preferred to go and what type of content they wanted to hear about. It also encouraged players to contribute through the final challenge, and it is telling that most players completed the experience and contributed with a recording. Moreover, the experience introduced a subjective voice into the space of the museum, subverting the expectations created by traditional audio guides, usually given in a neutral, depersonalized and authoritative voice.

Hidden Museum (Aardman, 2016) is a mobile application developed by the Bristol Museum & Art Gallery in collaboration with the University of Bristol and Aardman, a Bristol-based animation studio, with support from the Digital R&D Fund for the Arts. The app aims to give visitors, with a focus on families visiting as groups, a playful way of discovering parts of the museum they may not necessarily go into during their visits. Players download the app onto their mobile devices, select the

size of the group, a theme, the time available for their tour, age group, and a character badge, whereupon the app creates a personalised journey through the museum, including games and puzzles that players can complete during the tour (Bristol City Council, 2016). For example, players are directed towards a specific gallery on one of the floors, and as they arrive, the device automatically locates them, and shows them a picture that they have to memorise to then find and photograph as they explore the displays around them (Roberts et al., 2015, p. 14). The challenges are, therefore, location-based, as they cannot be completed if the players are not inside a specific gallery in the museum. The games were also designed to encourage player interaction with the physical space of the museum and the objects displayed therein, instead of focusing players' attention on the screen. The designers reported abandoning the idea of using certain capabilities that can be found in mobile devices, such as the gyroscope and accelerometer, as they found that challenges which involved people moving the screen, while fun and engaging, took their attention away from the exhibits around them and focused it on the device (Roberts et al., 2015, p. 58). The team decided instead to create challenges that directly referenced the real-world around players. This is a tension that exists when attempting to combine a digital, virtual layer with the real-world, as there can be too much focus on one or the other. Since the interest of museums is to enhance visitor engagement with their exhibits, collection, and galleries, it is a balance directing attention to that content, while keeping the digital layer meaningful.

In terms of aiding the players' navigation through space, the app uses a locative technology called iBeacons - small Bluetooth-enabled devices - which can be seamlessly attached to the galleries, automatically detecting the proximity of players' phones to certain points in the gallery, to then transmit content accordingly. The use of this technology in conjunction with mobile devices to enhance the museum tour was the novel point in this project, as it had been largely untested in a museum context. Therefore, the museum partnered with the University of Bristol's Graduate School of Education in order to conduct research alongside development. In total, over 120 beacons were placed into the museum galleries (Roberts et al., 2015, p. 11). While the use of this technology enhances the experience, it also means that these tools will only work on devices which include the aforementioned technologies, which not every visitor will have access

to. Moreover, working with new technologies implies a bigger financial investment for museums, both on the technology itself and the fact that it has not been perfected. Nevertheless, the project was a success regarding the objective of encouraging visitors to explore the museum further with the help of mobile and locative technology, as the authors reported that players 'visited parts of the museum that they had not been to before or would not normally have chosen to' (Roberts et al., 2015, p. 4). In short, the app was successful in steering the players' navigation of space towards where the designers wanted them to go, by making it part of gameplay.

The experience is a personalised quest-based tour, with location-based challenges which encourage players to explore and find items from the museum's collection. The *Hidden Museum* app suggests that challenge-based journeys through the museum in a format inspired by quests and treasure hunts, giving visitors challenges and directions, are effective ways to create an engagement that is two-fold. In terms of spatial exploration, players engage more deeply with the museum, with the experience directing them toward galleries that they have not previously visited, while in terms of engagement with the content, it encourages them to develop a deeper connection with the objects in display, by prompting them to look at them in unusual ways, framed and actioned within the game world.

As another example of a gameful tour, the historic country house Rufford Abbey in Nottinghamshire created an interactive multimedia experience around the sculptures that can be found in the institution's garden (Fosh, Benford, Reeves, Koleva, and Brundell, 2013). Based on the concept of trajectories in mixed reality experiences (Benford and Giannachi, 2011), the aim is to engage visitors to interact with the sculptures and form their own interpretations, by themselves or as part of a group. The experience was built in the form of a smartphone-based trail which leads visitors towards each sculpture, 'combining textual and audio instructions to drive directed viewing, movement and touching while listening to accompanying music' (Fosh et al., 2013, p. 149). Nine sculptures were designated as stops in the trail, and for each, a sound designer selected pieces of music, while a performance artist designated the ways in which visitors would interact with the sculptures (Fosh et al., 2013, p. 150). The order in which the sculptures are presented does not follow a particular thematic logic, instead

reflecting the order in which they would naturally be encountered while visiting the garden, so that visitors can freely choose which sculptures to visit and in what order. At each stop, visitors read instructions on their smartphone, which include information about the sculptures and direct visitors to put on their headphones. This gives them access to audio instructions created by the performance artist, which ask visitors to engage in a certain action while standing near the sculpture, to the selected music, which is used as a background accompaniment for that action. These actions are mostly physical, such as touching the sculptures, sitting in a nearby tree branch, while others are directed at visitors' imagination, asking them to imagine stories or answer questions (Fosh et al., 2013, p. 152). After that, visitors are asked to remove their headphones, and the screen goes back to displaying information about the artwork, which they can read while walking towards the next sculpture.

The creators found that most visitors who tried the experience visited all nine sculptures, following the order in which they appeared on screen. The use of headphones led visitors to have an isolated engagement with the artworks, even when they were part of a visiting group. Most visitors attempted to carry out the instructions to some degree, although personal interpretations of the meaning of those instructions varied considerably among visitors (Fosh et al., 2013, p. 153). The authors found that many visitors were reluctant to perform the more theatrical instructions, for example, marching under the arches of a sculpture, admitting to 'feeling "silly" or "self-conscious" about doing them' (Fosh et al., 2013, p. 155). Most visitors appreciated being given the official interpretation only after they had had the chance to develop their own (Fosh et al., 2013, p. 156). This reiterates the importance of personalization and the introduction of alternative voices, in addition to official interpretation, as suggested by other experiences already analysed here, such as *Ghostwriter*.

Even though the designers of Rufford Abbey's sculpture trail did not purposefully set out to create a gameful trail in the structure of a quest, instead using the concept of trajectories as a structural model, the resulting experience shares similarities with a quest, as it is a thematically directed navigation through space with playful challenges. Results suggest that visitors appreciated being given alternative ways of relating to the objects on display, such as the challenges given by this trail, the challenges suggested by *Ghostwriter's* narrator, and those

included in *The Hidden Museum's* games. However, it does give a word of warning towards adapting the challenges to the intended audience, as there is a risk of players feeling too self-conscious to carry out certain physical actions that draw attention to themselves (Fosh et al., 2013, p. 155). The lesson for game design is that, in order to minimise this risk, location-based game designers should create challenges that ask players to carry out actions that will not seem out of place at the location they will enact them in. For example, the actions may use the technologies available in their smartphones, which players may already use on a daily basis, such as recording a message, taking a photo, browsing a website, sending a text, and making a phone call. This way, players can use their abilities in novel ways as part of the gameplay, while not being asked to step too far outside their comfort zone.

In this section, I looked at a selection of quest-based tour experiences in museums, the gameplay of which suggests that these experiences are successful in enhancing the ways that visitors navigate the space of the museum and engage with the content therein. Several of the design strategies employed in the creation of these experiences can be found in *Treasure Hunters* (Aardman, 2018), an app-based treasure hunt experience created by the Science Museum in London, which is the focus of the next section of this chapter. As a player-researcher, I analyse a first-person gameplay experience of the game in order to determine the design strategies used, their effect on gameplay, and their efficiency in creating motivation and engagement with the museum content.

Case Study as Player: *Treasure Hunters* (2018) by Aardman and the Science Museum Group

My focus as a player-researcher for this chapter is *Treasure Hunters* (Aardman, 2018), an app-based treasure hunt experience created by the Science Museum Group in partnership with Aardman, who also created *The Hidden Museum*. The app was created as a digital extension to an existing museum resource, the *Great Object Hunt*, a paper-based treasure hunt experience that visitors can download, print, and take with them to the museum to complete the challenges while exploring the galleries (S. Carr, 2018). According to the museum team, the aim was to give visitors, specifically families with children five years-old and older, but also adults who enjoy games, confidence when visiting, to ignite their curiosity,

promote learning, and inspire the creation of personal connections to the objects (ibid).

Treasure Hunters is a free mobile app that can be downloaded and played on iOS or Android devices. After players download and open the app, they are introduced to the game and instructed on how to play. They can assemble their team or play the game as a solo experience, and choose if they would like to play in a museum or somewhere else. They are told that the gameplay entails earning points and badges by completing challenges, which they can do by taking photographs with their phones. Once they click through the instructions to play, the app asks how many players or teams are playing. Each player can enter a name and choose an avatar, either by taking a picture or by choosing one of the existing animated avatars. Players can choose from avatars that seem thematically appropriate to the museums, such as a planet, rocket ship or robot, but can also choose others that are unrelated to the museum content, such as an ice cream cone or a cactus. Players can then choose to play in a museum or elsewhere. When choosing a museum, they get the choice of the several museums in the Science Museum Group, all located around the United Kingdom, with different particularities within the themes of industry, science and discovery. This gameplay analysis is based on two gaming sessions in the Science Museum in London, one as a solo player, and one with another player. Once players have made their choices, the game begins.

The game's main mechanic consists of players completing challenges by exploring the space around them, observing the objects in that space, and interpreting the questions through recognising or making connections between the objects and the challenges. Challenges instruct players to find and photograph objects they 'could use to make a noise with', that are 'made from more than one material', or that 'helps us communicate', among many possibilities. The challenges require players to use the camera feature in their smartphones to take photographs when prompted by the app, and once they have a picture they are happy with, to hand over the phone to the next player, so they can choose their object and photograph it (see Appendix A.2.2). These challenges are the same for the single-player and multiplayer experiences. The multiplayer experience, however, requires players to debate amongst themselves to decide which photograph is the better response to the prompt. Moreover, it

gives players extra challenges that they must complete together to earn badges. Challenges are randomised, which means that the gameplay experience is different every session. The experience continues in the same format until players decide to end it, at which point the final scores and badges earned are shown.

The game is based on a treasure hunt structure. While the game takes players on a physical journey around the museum, based on exploration and completing challenges as the main part of the gameplay, the fact that the experience does not have a clear beginning and end distances it from a quest format. While this has the benefit of giving players more agency on deciding how short or how long they want the experience to be, increasing their autonomy, one of the basic psychological needs for intrinsic motivation (Ryan and Deci, 2000), it does have the effect of leaving players without a sense of completion once they decide on their own that they do not want to play anymore. This lack of a thread and of a sense of evolving abilities has the risk of leaving players without a clear understanding of what the aim of the experience is. In terms of creating motivation for exploring the museum, the app gives guidance and structure to the tour, transforming it into a treasure hunt. As a player, this feels more motivating than not having a purpose for the visit. It also has advantages compared to the museum's pre-existing paper-based treasure hunt experience: the challenge prompts are similar, but the app allows players to take photographs, gives them rewards for completing the challenges in the form of points and badges, automatically keeps track of the players' scores, and shows the players how well they are doing at the end of each round. Having the game system respond instantly to players' actions is engaging. However, this is negatively impacted by the challenges and how rewards are awarded. I argue that the way that the challenges work, especially in the multiplayer side of the game, does not necessarily enhance the museum tour for players.

The challenges in *Treasure Hunters* are based on interpreting the prompts from the game and how to respond to them, exploring the space, finding and observing objects, photographing them, and in the case of the multiplayer experience, deciding which choice is the best. The prompts focus on what the objects do, how they can be used, how they were designed, and their physical characteristics, such as the materials they are made of and their size, among other possibilities. The challenges require players to understand objects and make decisions on

what they think about them. However, as previously mentioned, the way that the game awards points and badges, in the solo and multiplayer versions of the game is not necessarily conducive to engagement with the museum content and motivation to visit.

In the single-player version, any photograph taken, no matter what the object is or how well it responds to the challenge is considered enough by the game system to give the player a reward, in the form of congratulations and badges. Once a player realises this, the reward loses its meaning, as it becomes apparent there is no way to fail a challenge. In the multiplayer version, the game gives players two types of challenges. The collaborative challenge is essentially the same as what a solo player would do, but players have to decide together what they want to photograph, and they always receive a badge for doing it. The most numerous are competitive and follow the same format as the single-player experience: players are given a prompt and must find and photograph an object that responds to that prompt. Once all players have taken a photograph, the app instructs them to debate and decide which contribution responds to the challenge better. Players then have to choose one of the options, or, if they cannot agree, ask the app to decide. For example, the game asks players to 'take a picture of something powered by steam pressure' or 'the most colourful thing you can find', and then debate and decide on 'which one had the most creative answer' or 'which one is most colourful'.

The issue arises in the fact that if players do not concede to the other players' answers being better, and they decide to ask the app, the choice on who wins the round is random. This is not immediately apparent, but becomes so as the game progresses, and there is no discernible reason for the system to pick one contribution over another. While this avoids the potential issue of the system making predetermined choices on the quality of submissions, it does diminish the importance of competition. Ultimately, according to the game system, it does not matter what the photograph is of; there is either no possibility for failing, or, barring a clear winner in the debate, that possibility is random and independent of skill. In practice, this leads to situations such as this one from my multiplayer game session: after taking a photograph of something that would help us get home, and when the debate over what choice would be better ended in a stalemate, the app chose the USS Enterprise over an aeroplane as the winner

(see Appendix A.1.3). While this may encourage players to debate further, it does make the competition, and consequently the winning conditions, feel less about skill and more about arbitrary decisions, which does not tap into the feeling of competence that increases their intrinsic motivation (Ryan and Deci, 2000).

The challenges are built around the theme of objects, their design, use and characteristics, but are not specific to any of the museums, or even to a museum space. This is an intentional design feature, as the app was created to be played anywhere, and to draw players' attention to the characteristics of the objects around them, regardless of where they are. However, this choice translates into generic challenges that are not location-based. The expectation, when using a museum app, is that the gameplay adds something to the visit. As someone who regularly visits the Science Museum, I felt that this novel way to visit was potentially interesting, but fell flat in execution, an opinion which I saw reflected in the other player. In reality, as the player who accompanied me mentioned, the app does not encourage you to visit the museum to play, as there is the feeling that it could be played anywhere, and that the museum setting is an afterthought. Likewise, as the app considers any photograph to be the right answer, engagement with objects may be superficial, unless players are deeply committed to initiating a debate. As someone who enjoys debating objects in museums, this lack of criteria and the seeming random choice of 'winner', despite its at times comedic value, felt more like an annoyance than an invitation to debate. On the positive side, challenges are based on taking photographs of objects with mobile devices, an activity that many visitors already engage in when visiting, and which becomes more structured through the use of the app. Players have agency in that they may choose to skip certain challenges until they find one that corresponds to their interests, and the prompts encourage them to develop their own interpretations about the objects as they choose what to photograph and debate which option is the best response to the challenge.

Treasure Hunters is an example of how the museum tour can be made gameful through the implementation of challenges, rewards, competition and collaboration. The treasure hunt format, with the addition of digital capabilities is useful in providing structure to the museum visit, as it gives players a purpose for exploring the space, finding and understanding objects, and discussing those objects with one another. Due to the timings in the case studies of this

investigation, my analysis as a player-researcher of *Treasure Hunters*, in 2018, occurred after I had developed the case study as a games designer for this chapter in 2016, so the lessons learned as a player were not applied as a designer. Nevertheless, the experiences have game elements and mechanics in common, developed with different game design strategies, which allows me to compare the results of the gameplay analysis to the conclusions from this section.

Case Study as Game Designer: *The Great Exeter Garden Quest* (2016)

This section is dedicated to the design process and gameplay analysis of *The Great Exeter Garden Quest* (2016), the case study I developed for RAMM using game elements and mechanics to make the experience that visitors have when they tour a museum more gameful, in this case by turning the tour into a quest. Unlike the other case studies I developed for this investigation, this experience was not created as a direct collaboration with other game creators. Instead, I decided to build upon existing resources in the museum by using a digital platform previously developed by RAMM, adapting it to design a new location-based gameful experience. This process translated into a valuable lesson for the investigation and, subsequently, for the location-based game design framework itself: the limitations inherent in relying on in-house capabilities, and the need to engage in partnerships and collaborate with other game creators in order to create better experiences for players. As a background to the design process, I begin by explaining how the project was informed by the museum's collection and its temporary exhibition program. I introduce Exeter Time Trail, the digital platform chosen to create the gameful tour experience, detailing the practical advantages and disadvantages that I found during the design process. I then describe the iterative game design process of creating the quest-based experience, including how the game elements mentioned previously in this chapter were incorporated into it, interweaving them with the objectives defined for the experience in collaboration with the museum's collections team. From observing and interviewing players, I study the results and draw conclusions about the effectiveness of using a quest structure to enhance the museum tour and increase visitors' motivation and engagement.

The Game Design Process

The design process of *The Great Exeter Garden Quest* followed a broad format (see Appendix B) which I subsequently applied to every game experience created as part of this investigation, with adaptations where necessary according to the nature of the game being created. I started by writing a game design document listing the aims of the project, how it fits into this investigation, a description of gameplay, the content I planned to include, actions and events organised into a timeline, and the people involved (see Appendix B.1 for the first version of this document). This became a living document which was shared between everyone involved in the project and evolved as plans and circumstances shifted. Changes include the addition of the textual and visual content of the quest, a more detailed description and timeline, and the plan to make different versions of the quest, which was later abandoned due to time constraints in favour of including optional bonus challenges (compare Appendix B.1.1 and Appendix B.1.2). As it did not involve external contributions beyond the use of the existing digital trails platform, the development process for the quest consisted largely of research, development and playtests I carried out with the assistance of Rick Lawrence and the Collections team at RAMM (see Appendix B.2 for documentation). The following paragraphs explain in detail the choices which are included in the game design document.

Creating a location-based gameplay experience begins with an understanding of the location and the establishment of the experience's aims (see Appendix B.1). In all the case studies developed with RAMM in the context of this investigation, the process began with discussions with the museum's collections team, in order to take into consideration the museum's needs and aims from the start. Starting from the decision to focus on the tour as the main component of the museum visit to be incorporated into game design in this chapter, the next step was to consider how a case study for a quest-based museum visit could be orchestrated to work in tandem with the rest of RAMM's programme, as well as encourage players to engage with the museum's collection. I started by looking at the museum's scheduled 2016 programme, and settled on the Naturally Inspired season, which began in April 2016 and included exhibitions, community activities, and events such as talks, tours, workshops and competitions on the theme of botanicals, gardens and landscapes. After discussions with the museum team, I decided to

link the experience to the temporary exhibition *International Garden Photographer of the Year 2016*.

The *International Garden Photographer of the Year (IGPOTY)* is a photography competition focused on the theme of gardens, plants and natural environments, run by Garden World Images Ltd. in association with the Royal Botanic Gardens, Kew, United Kingdom, open to photographers of all ages and skill levels from around the world. Every year, the winning photographs are published in a coffee table book and shown in an exhibition that starts in Kew Gardens and subsequently tours the United Kingdom, including Exeter. The aim for RAMM's quest-based experience became to encourage players to engage with the exhibition's theme in a creative, participatory and fun way, as well as use the experience as an opportunity to create links with objects in the museum's collection. As an outcome for the quest, I was interested in taking players on a journey that enhanced their interpretation of the exhibition's content. Since it was organised in conjunction with a temporary event, I decided that the experience would be available to the public for a limited time, coinciding with the months that the exhibition was at RAMM, from April to August 2016. Due to its theme focusing on the outdoors, the quest did not need to be limited to the museum's building, and instead could make use of Exeter's public parks as an additional space for the experience. Beyond being more reflective of the exhibition's theme, giving players the opportunity to engage with it both in and outside the museum, this was also an opportunity to highlight the connections between the museum's collection and its surrounding physical urban environment, expanding the galleries outwards into the city. Finally, since the exhibition was focused on photography, it made sense for the quest's challenges to be based on photographic skills. Taking advantage of the fact that the quest was accessed through players' smartphones or tablets, which include built in cameras, the quest challenges players to create and share photographs responding to a particular action or topic related to the theme of the quest (see Appendix B.3 for an example of what a challenge looked like in the game).

In terms of the technology used to create the quest, I made the decision to adapt one of the digital platforms that RAMM had developed for a previous project. The reasons behind this decision were twofold. It made it possible to keep the development costs low, and it also allowed the museum to reuse resources and

keep them up to date, demonstrating sustainability and an optimal use of assets. After analysing the different options, I decided to adapt Exeter Time Trail, an online tool that allows users to create and share location-based multimedia trails. This decision was informed by the aforementioned similarities between the format of trails and quests, with the expectation that trails can be transformed into quests through the implementation of game elements and mechanics. Moreover, the platform is versatile enough to allow users to go beyond the creation of simple trails, supporting ways to enrich the experience with various components, including a map with icons showing each stop, images, videos, audio, text and web links. Trail creators also have the option of allowing participants to contribute their own responses to the trail, in the form of photographs, audio recordings and text comments, which can in turn be shared on various social media.

Funded by the Research and Enterprise in Arts and Creative Technology - Higher Education Innovation Funding (REACT-HEIF), the Exeter Time Trail web app is a collaboration between RAMM, the Centre for Intermedia at the University of Exeter, 1010 Media, and Exeter City Football Club Supporters Trust (Giannachi et al., 2014, p. 97). The project's creation was informed by the mixed reality trajectories framework, mentioned in the introduction to this thesis (Benford and Giannachi, 2011), as well as research into what contributes to creating a sense of presence in various environments (Giannachi, 2012). The tool allows participants to contribute content, by building and sharing trails that combine archival material from the museum with physical locations, but also by recording and sharing their reactions to existing trails, helping them create connections between their own lives and the histories connected to the environments in which the trails exist (Giannachi et al., 2014, p. 109). Once this platform was selected as the tool for developing the quest, the next step was to adapt the game design strategies to the limitations of this tool. Certain features that could have been considered, such as having a win condition, could not be incorporated. As I describe later in this section, while there are challenges in each location that the player is asked to complete, the system does not track the completion of tasks, meaning that the player is responsible for keeping track of the challenges that have been completed and those that are still open. These and other limitations are not shortcomings of the platform, but are instead a natural consequence of pushing the technology to do things it was not initially built to do.

In order to design the quest-based experience, I started with the goals of the experience: to encourage visitors to the *IGPOTY* exhibition to engage with the exhibition's theme as creators, instead of just viewers, with the belief that this would deepen their experience as visitors, to encourage players to discover places in the city of Exeter they may not have been to before, and show them connections between the city and RAMM's collection that they may not have been aware of. The second step was to define the target audience: visitors to the museum who are interested in games, photography, or both, and who use their smartphones to engage with their surroundings.

I began by creating a list of possible physical locations that fit with the chosen theme from Exeter's public gardens and parks, then visiting those locations on foot, starting from the museum, to mimic how players themselves would travel during the quest, in order to assess accessibility conditions and determine how much time and physical effort it would take to travel from one location to another (see Appendix B.2.1 for notes on design). I studied the history and characteristics of potential locations in order to find connections with objects in RAMM's collection. These connections could be historical, such as a park with a Roman wall connected to the Roman artefacts on display in the museum; thematic, such as a location that serves as living environment for animals which can also be found in the museum's taxidermy collection; or in terms of authors, for example, sculptures by Barbara Hepworth can be found both in RAMM's collection and in the public grounds of the University of Exeter. Finally, I planned the photographic challenges. Taking into account that players of all skill levels should be accommodated, the challenges suggest actions and themes to players, but leave them enough space to create their own interpretation of the rules, thus acting as a frame that restricts their options while giving them a degree of agency to decide what to create and share.

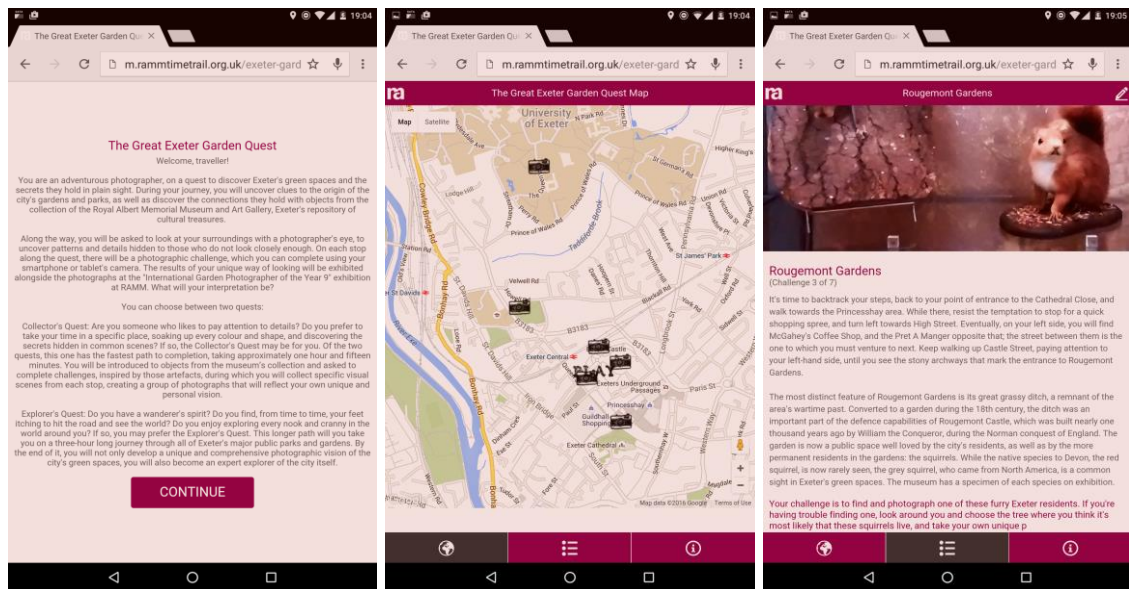


Figure 2.1. Screenshots of the final version of *The Great Exeter Garden Quest*.

The design of the experience itself took on an iterative quality, during which I experimented with variations on the format. The first version of the quest included the locations and in which they should be visited, photographic challenges, and a list of objects from the museum collection, to which I then added the introductory text, the directions for players to travel between locations, and the descriptions of the locations. In order to direct players from one location to another, beyond the inclusion of a map with the locations indicated as icons, a short paragraph was included that referenced physical landmarks to help players navigate the city. The quest text was fleshed out with a simple storyline, based on a call to action that puts players into the role of a nature photographer, exploring the city, learning about its history and RAMM's collection, and developing photographic skills along the way. I made the decision to not invest in storytelling or roleplaying, as the platform was not conducive to them, and I did not want players to spend too much time reading on a screen instead of observing and exploring the locations and completing challenges. Each location showed players images of objects from the museum's collection, with a short description of those objects, a paragraph introducing players to the history and characteristics of each place, a photographic challenge, and directions from one stop to the other (Figure 2.1).

**This image has been removed by the author of
this thesis for copyright reasons.**

Figure 2.2. The last challenge of the quest during an early playtest, which involved engaging with the sculpture *Figure for Landscape* (1960), by Barbara Hepworth, was deemed too far away and hard to reach during early testing, so it was transformed into a bonus, optional level.

The photographic challenges were tweaked during each iteration according to how fun and compelling they were deemed to be by playtesting. One particularly useful piece of feedback received at this stage was that the last location, the University of Exeter's Streatham campus, required physical effort to be reached. However, given how interesting the location and challenge were for the quest, one player suggested that it could be turned into a bonus level, that is, an optional challenge that players could decide to pursue or decline (Figure 2.2). The bonus level would thus enhance player agency, by adapting the quest to their preferences, physical fitness, and time available for completion. This example shows the importance of incorporating a playtesting stage into the design process (see Appendix B.2.2 for documentation of this playtesting session). The possibility of offering players a reward for the successful completion of the quest, such as a badge, sticker or postcard, was initially considered. However, this option was later abandoned, as it was decided that the goal of the quest would be to reach the exhibition, completing challenges, and developing photographic skills along the way.

The design process of *The Great Exeter Garden Quest* represents the most cost-effective of the games developed as part of this investigation, as the development

was carried out in-house, using an off the shelf platform without the involvement of external game designers, on a budget that was limited to tweaking the existing Time Trails platform and refreshments for workshop participants. The low investment makes this strategy attractive to institutions facing diminishing resources and to those who wish to experiment with game design prior to bigger commitments, but it comes at the cost of additional demands on staff time, often accompanied by the need to compromise on skills that do not exist in house.

In terms of promotion, materials such as a trailer video and QR code cards were produced by the author (see Appendix B.4.5). There was no follow up on the effectiveness of publicity efforts, a shortcoming which undoubtedly contributed to the low uptake on contributions from players for this and the other games created as part of this investigation. Other challenges encountered during the design process derived from the aforementioned attempts to use the underlying digital system for something that it had not been designed to do: for example, the system did not recognise a specific user from one challenge to another, meaning that players had to input their name, email address and accept terms and conditions every time they tried to upload a photograph (see Appendix B.4.3). In hindsight, carrying out more playtesting sessions would have made visible more of the system characteristics prior to the launch, a lesson which became part of the game design framework at the outcome of this investigation.

Once initial feedback was incorporated, the quest was implemented and made available to the public, shortly after the *IGPOTY* exhibition opened at the museum.

The Gameplay

This section is dedicated to the description and analysis of the gameplay in *The Great Exeter Garden Quest*, based on a gameplay session in May 2016 (see Appendix B.4 for documentation of this gameplay session). During this session, I engaged in direct observation and documentation of those players' behaviours (see Appendix B.4.1 and Appendix B.4.3), and conducted a semi-structured focus group discussion (see Appendix B.4.4) that gave insights into players' motivations, preferences, and experiences while playing and visiting the exhibition after the gameplay experience, as well as observation and documentation of previous playtesting sessions. Participants were adult

respondents to an open call to participation by the museum and myself, and organised into teams of two. The observation and analysis of gameplay is focused on players' experience of the quest, their perception of the challenges, social dynamics that could be observed during play, the experience of the museum visit, as well as issues and suggestions pointed out by participants.

The quest opens with a welcome screen that greets players as travellers and explorers, and invites them to an experience which puts them into the role of a nature photographer, whose aim is to explore Exeter and look at their surroundings with a photographer's eye, intent on recognising and documenting visual patterns and details (see Appendix B.3). The gameplay is action-driven, placing emphasis on spatial exploration and photography-based challenges rather than storytelling or roleplay. The quest takes players on a physical journey that starts at RAMM's aptly named Garden Reception, travels around the Exeter city centre, and ends back at RAMM, at the *IGPOTY* exhibition. Along the way, players visit and explore five public parks: the Cathedral Green, Rougemont Gardens, Northernhay Gardens, Bury Meadow Park, and the optional level, University of Exeter's Streatham campus. The various locations are indicated on a map, available for players to consult at any time during the quest. The experience is one of progression, since the quest asks players to find locations in a specific order. Whenever players reach a new location, the quest shows them an image of an artefact from the museum's collection that is thematically or historically related to that location, taking the museum's collection out of the building and into the city.

Respecting the nature of location-based gameplay experiences, the quest's photographic challenges were created in response to each location. For example, in Cathedral Green, players are challenged to create a photograph in which the cathedral's building appears, but not as the central focus of the image, while in Rougemont Gardens they are tasked with finding and photographing a squirrel, or alternatively, selecting and photographing the tree where they think it is most likely that a squirrel might live. While the challenges give players specific directions, they are open enough to allow them to create their own interpretations within the rules given by the quest (see Appendix B.4.2 for examples of these interpretations). The challenges thus encourage players to become not only explorers, but also content creators. As players respond to the challenge, their

photographs are immediately shared on the platform, allowing them to see the results of their efforts, and also how other players responded to each challenge. At the end of the quest, players go back to the museum and visit the *IGPOTY* temporary exhibition.

The feedback from players during and after the experience was generally positive, focused on the enjoyment of the experience and how it allowed them to learn new things (see Appendix B.4.4). The creation of an experience that involved physical locations beyond the museum building, in a way that made sense within the theme of the exhibition, had the effect of expanding and augmenting the space of the museum, both physically and virtually, by letting players learn about the collection beyond the galleries. Player 2 described this connection: 'It does extend the museum experience. [...] it's nice to have [the inside and outside] connected so that your museum experience isn't isolated from the city.' Several players reported that, although they were local to Exeter or had visited the city before, they had never visited all the locations featured in the quest. The experience thus served as a reason to visit places that they would otherwise 'never have bothered going to' (player 4). The players who had visited these locations before reported that the facts incorporated into the quest text, which gave historical contextualisation to the locations and indicated connections with objects in the museum's collection helped them learn new facts about the locations. This learning was not forced upon players, and instead occurred as they were engaged in the quest, reading the story and interpreting the challenges: 'you go through the activity, which is fun, and you enjoy it [...] but at the same time you learn something exciting and new about the city' (Player 5). This type of learning that occurs during gameplay, sometimes denominated 'stealth learning' (MacCallum-Stewart, 2011), is common in the experience of playing videogames. While not specifically focused on education, the quest still promoted learning about the museum's collection as part of the experience.

According to players, the photographic challenges were the most engaging part of the experience. During the focus group discussion, players mentioned that one of the benefits of the quest structure was that, beyond taking them on a tour of locations, as a trail would, the quest gave them tasks to complete upon arrival on each location, turning a mostly passive activity to an active one. Player 4 admitted that they were 'surprised by how much I enjoyed it,' as they had thought the quest

would entail just ‘walking around’, and appreciated the fact that it was instead an experience where players were asked to be creative and contribute content. The action-based role of a photographer was, for most players, slightly out of the ordinary, in the sense that they were taking photographs based on specific directions, but not completely alien, as many of them reported occasionally using their mobile devices to take photographs in different contexts, so the quest did not ask them to perform actions that were too different from what they were already comfortable doing in public.



Figure 2.3. A selection of player-contributed photographs for the fourth challenge in the quest, in the Northernhay Gardens. From left to right: Player 1, Player 1, Players 5 and 6, Player 2, and Player 4.

Most players created and shared one photograph per challenge, while others took several, choosing to experiment with their interpretation of the challenge’s rules. For example, in the Northernhay Gardens, the challenge was to create a photograph that showcased the colours and textures of the natural environment. Player 1 chose to contribute with photographs of different flowers, walking some distance into the gardens to find them, while players 5 and 6, who played the quest together, chose to photograph a single plant that could be found near the entrance (Figure 2.3; see also Appendix B.4.2). While the quest was designed for players to spend around five minutes in each location, this timescale was found to vary considerably, according to both the location’s characteristics and the challenges proposed to players. For example, the challenge in the Rougemont Gardens, which involved looking for and photographing squirrels, was the one that players spent the most time trying to fulfil, with most players choosing to look for squirrels instead of giving up and photographing a tree, as directed by the challenge.

To link to the *IGPOTY* exhibition, challenges were built to promote the development of visual literacy and photographic abilities, including thinking about composition, colour, background and foreground, framing, and textures, among others, a strategy that was deemed effective:

Player 4: I think it was quite good to have a bit of direction as well. Like, having the challenge to do. Because otherwise, I don't take many photos. It was good to have that, because then there was no thinking, you know, what am I going to do? What am I going to take photos of? (Player 4)

The challenges were also intended to work in unison with the historical contextualisation, as well as the information about related objects in the museum's collection. Several challenges directly referenced these objects: for example, the squirrel challenge in Rougemont Gardens referenced RAMM's extensive zoological collection, and the challenge at the University of Exeter's Streatham campus asked players to use Barbara Hepworth's sculpture, *Figure for Landscape* (1960), as a photographic frame, while showing players an image of the artist's *Figure in a Landscape (Zennor)* (1966), which is part of the museum's collection. The success of this approach is exemplified by the following exchange, during the group discussion:

Player 6: I think that the directions are good, but it's also nice that it has a bit of history of each place as well.

Player 5: Yeah, that's the part I most liked. Because you go through the activity, which is fun, and you enjoy it, because it's outside, but you at the same time learn something exciting and new about the city. And then, through the photography you connect with that. [*gestures toward the IGPOTY exhibition*] So I thought it was a very good flow of everything. Very complementary to each other.

These results reinforce the importance of creating challenges that give players enough direction to provide them with a discernible and achievable goal for the activity, but keep it open enough that they can interpret the challenge and carry it out in their chosen way. They also suggest strategies useful to the success of location-based game design, such as clearly connecting the challenges to the exhibition's theme and to the locations they occur in. As in the later *Treasure Hunters* app, there was no right or wrong answer to the challenges, and the system did not automatically keep track of how players responded to challenges. This is something to keep in mind for game designers to address in future projects.

The quest was built as a single-device experience, but it accommodated both single-player and multiplayer collaborative gameplay (see Appendix B.4.3 for observations taken during the experience). As a group experience, two types of social dynamics were observed: one in which one player acted as leader, reading the text and following directions, while all players took turns completing the photographic challenges; and another in which groups of players each had their own mobile device in which they followed the quest, but did it in conjunction with others in their group, discussing facts, directions and challenges as they played. During the main gameplay session, all players went on the quest as part of a two-player team, most of whom were friends who had decided to do the quest together, and one group was a couple. The majority of players used their own mobile device, with only one two-player group deciding to share the same smartphone to follow the quest and complete the challenges. In each location, players in a team gathered to read the text, follow directions, and discuss the challenge. Once they decided to start the challenges, players often separated and wandered the location on their own in search for a place to photograph, joining their partner to ask for feedback once they had a photograph they were satisfied with. Gameplay as a single-player experience followed the same format, with the difference that time spent in each location was shorter, as players did not stop to discuss the challenges and to ask for feedback from teammates. In short, the quest creates a personal journey that can be done individually or as part of a group, adding an optional social aspect of gameplay to the experience.

Other social interactions were prompted by the challenges themselves: for example, in the Bury Meadow Park, the challenge was 'to collect photographic evidence of human presence against the natural backdrop of the park. For example, the photo can be a portrait, or include a built structure, or an object that someone left behind.' Several players decided to make portraits, photographing each other or approaching strangers in the park to ask for permission to take their portrait. In the case of this particular challenge, the collection objects, a pair of nineteenth-century parasols, and the description of the location also alluded to the social nature of public parks. This suggests that, in addition to the quest structure, the design of the challenges themselves contributes to the strategies players employ to fulfil the challenges. In this particular case, most players

interpreted the challenge as focused on social connections, which was in turn reflected both in their photographs and the strategies employed to create them.

Feedback about the *IGPOTY* exhibition was unanimously positive among players, who discussed the photographic techniques on show with each other while wandering the gallery, and praised the exhibition in terms of the talent of the authors and the quality of the photographs, mentioning qualities such as the use of colour, light, and texture. In this, there was no discernible distinction between the comments from players and non-players. When asked if they identified with the authors in the exhibition, some players reported not feeling confident regarding their photographic abilities. However, they also reported feeling closer to the creative process, as they had attempted to create something similar shortly before, which enhanced their awareness of the work that had gone into each photograph. When asked about the impact of the quest on their experience in the exhibition, players described how being put in the same role as the artists on exhibition, that of amateur nature photographers, helped them connect more deeply with the images on view:

Player 3: I think it probably gives you a bit of context on how hard it might be to get such great photos. [...] You've just shortly before tried yourself to take a photo. So I think it's interesting to go from trying yourself to seeing some really great examples of people doing that.

Player 2: Yeah, I think I also feel like I wouldn't necessarily be very connected to... I'd look and think that they were all experts, but actually having tried it first did for me, make me feel like I was more linked into it. So, yeah, closed the distance.

Player 1: Yes, because it sets up your minds to... To see that way as well. [...]

Player 4: Yeah, because you've had a taste of how it works. You get an idea of the skill that's involved. [...] It's not just point and click, it's this skill. I think that's very good compared to previous exhibitions I've been to, where I've looked around and go, that's very nice, that's a nice painting. But you're sort of distanced from it.

This suggests that the quest was successful in promoting a deeper engagement with and understanding of the exhibition's theme, namely, to promote and celebrate nature through the eyes of all creative people, no matter their age, nationality, or professional level. More than going on a physical journey with actions, through a combination of challenges that gave them goals and sub-goals, requiring skill to complete while they are being taken on a narrative and physical

journey, the players changed their perception of the work involved in photographing nature, enhancing their engagement with the exhibition on show at the museum.

Even though most of the feedback from players was positive, there were some issues with the quest that became apparent during the gameplay experience, as well as suggestions that the players gave the team for future improvements. The majority of issues were related to the technology of the quest. Problems included incompatibility with certain smartphone models, as well as bugs that prevented players from uploading their photographs to the website. These issues were related to the underlying platform used to create the quest, and were forwarded to the developer for troubleshooting, indicating the potential advantages of working with developers and creators in future projects. As for suggestions for future work with games in museums, one player suggested that they would have liked the experience to be longer, while others suggested that the quest could be expanded to other themes and locations, as evidenced by this exchange between two players, who did the quest as a group:

Player 6: For the future, an idea would be to do different ones with different themes. So this one is nice, it had the gardens, but one along the river, for example. [...]

Player 5: [...] it would be great maybe to link it with the tourist information centre. [...] So you have access to the exhibition in the museum of the town, plus an activity outdoors. I think it's fantastic. Because you can learn a lot from the city and from the exhibition. So if they would offer it, I'm sure many people would access it. If they offered it to me, in a new city, I would definitely take it.

In summary, the use of location-based game design to transform a trail-based museum tour into a self-guided quest, with a start and end point, a physical journey, and challenges, which players access and follow through the use of digital technologies, proved beneficial in several ways. The main effects include motivating players to visit the museum, to visit locations connected to the museum, to develop their skills, and to engage with the content on exhibition in the museum. Creating motivation through feelings of autonomy, competence, and relatedness (Ryan and Deci, 2000) was achieved by giving players agency in deciding how to interpret and complete the challenges, by making the challenges about photographic skill, and by accommodating social gameplay.

Conclusion

To summarise, this chapter was dedicated to the development of location-based game design strategies that incorporate the museum tour, by transforming its structure using a quest or treasure hunt format. After introducing a selection of strategies that have been used by museums to enhance the tour experience, I explained what the quest structure entails and how it shares similarities with the format of museum tours. I analysed the design choices and resulting gameplay experience of a mobile app that turns the museum tour into a treasure hunt. Finally, I developed and analysed the case study for this chapter, *The Great Exeter Garden Quest*. The quest gave players an action-based role, taking them on a physical journey that included facts and images for historical contextualisation and creating connections to the museum's collection, and location-based challenges intended to spark the players' creativity, help develop their skills, and engage more deeply with an exhibition's content.

Within the broader context of this investigation, the research and related case study conducted for this chapter was dedicated to the tour as one of the components of the museum experience that can be enhanced through the use of location-based game design. The game design process was focused on re-thinking the museum visit as a player journey, with a set beginning and ending, a path, challenges, and a goal. Several key findings can be identified following the analysis of the resulting gameplay experience. Data suggests that a quest structure, with clear start and end points, social gameplay, challenges that encourage players to employ creativity in their responses to the directions given, while also giving them space to create their own interpretations, improves motivation to engage with the museum content, increasing players' identification and engagement with the exhibition's theme, which was the main objective for this case study.

Additionally, during this case study, I identified possible paths to investigate further in this thesis. The use of an existing platform to create the game suggested the use of existing games or game-making software to help design gameplay. Moreover, the fact that I designed and developed this experience without the collaboration of other game creators translated into a more limited gameplay experience than would have been possible to create in a partnership. As such, this case study represents a relatively limited strategy for museums to

apply location-based game design, and its effects on the museum experience are expected to be weaker here than in the case studies developed and studied in subsequent chapters. Nevertheless, this experience is useful as an entry point, both for this investigation and for museums that are looking into experimenting with location-based game design, but are not ready to commit to more complex projects. Simple game design projects, which make use of the museum's existing resources, are useful to test ideas and game elements that can be developed further in the future. The following chapters in this thesis demonstrate how to take location-based game design further by collaborating with game developers in order to create more complex gameplay to be integrated into the museum experience.

Chapter Three – Game Worlds and the Museum Collection

This chapter focuses on the analysis and development of game design strategies that incorporate collection objects into location-based gameplay, either by transforming those objects into playable landscapes, or by making them part of the environment in a game world, and determining how that transformation affects visitors' engagement with those objects. I also study how organising events based around those game worlds, in addition to giving players the possibility of seeing the original objects, influences people's motivation to visit the museum, engage in gameplay and learn about the objects. This chapter focuses on the construction of game worlds that can be navigated, explored, and interacted with in gameful ways. To that end, I selected *Minecraft* (Mojang, 2009) as a tool for the collaborative creation of game worlds with professional digital creatives and the players themselves. These game worlds work as digital augmentations of the collection objects into virtual playable spaces which can afford gameful interactions as well as conveying information.

Collection objects are at the centre of museums' identities and missions. The particular objects in a collection shape the experiences afforded and stories that can be told by each institution. The limited exhibition space physically available to museums means that most of the objects in their collections are not regularly on exhibition, and those that are cannot be physically surrounded by all the knowledge and resources the museum has acquired around those objects. To circumvent this limitation while respecting the original objects' characteristics and integrity, museums rely on digital technologies to expand the knowledge space around a particular object into virtual space. Collections are now routinely digitised and shared online, and the near infinite virtual storage space available means that museums can share with visitors more information than ever to accompany the objects. This virtual augmentation has been done using various digital technologies, such as mobile apps, augmented and virtual reality, 2D and 3D scans. These technologies help populate a virtual space which visitors can access through the use of tablets, smartphones, and other portable devices. These technologies can be used to give visitors access to more information about a given object than that which can be found in an exhibition, decreasing the burden on the museum's physical space while still accommodating the curiosity of those who want to know more about the collection. It also allows visitors

themselves to contribute to the information space around that object, by adding photographs, comments, links and other annotations to that object's virtual space. In this chapter, I study strategies to do this augmentation through the use of location-based game design, making the virtual space around an object playable as part of a game world, and connecting it into the museum's physical space and exhibits through the creation of experiences based on that game world and the original objects.

Game technologies allow the creation of sophisticated simulations within game spaces, allowing for objects in a museum's collection to be replicated within a game's environment, or themselves transformed into game worlds. Besides being recreated and transformed into game worlds which can be explored by players, these objects become gameful through the addition of non-playable characters, goals, quests, narratives, meaningful choices, and other elements commonly found in games. Games allow diverse forms of interaction with objects which usually can only be looked at by visitors. Compared to other digital technologies used by museums for the same purposes, by making that interaction gameful, that is, structuring it as part of a gameplay experience that includes exploration, discovery, curiosity, entertainment and knowledge acquisition, games may increase the visitors' motivation to engage with objects and enhance and diversify that engagement. If we use sandbox games, such as *Minecraft* (Mojang, 2009), which allow players to build their creations inside the game, we also tap into the creator culture surrounding games. These game worlds can then be linked back to the physical space of museums, and the objects therein, by allowing visitors to play the game inside the museum, alongside the objects, and organising gameplay and social events that emphasise the connection between the game worlds and the museum experience.

In this chapter, I begin by looking at the augmentation and transformation of collection objects using digital technologies, and identify the ways that game design can be used to improve that process. I examine how museums have used online spaces, scanning technologies and virtual worlds in order to increase the amount of information associated with collection objects and diversify the ways that visitors can access and interact with that information, and the resulting experiences that become part of the museum visit. I identify the possible game technologies that can be used to fit and enhance those processes, and justify my

choice of focusing on *Minecraft* as the main tool for this case study. As a player-researcher, I analyse examples of museums in the United Kingdom that have used *Minecraft* as an engagement tool, both in the transformation of objects into navigable game worlds and by incorporating objects into game worlds that serve as context for them. Finally, in collaboration with a team of professional *Minecraft* creatives, and drawing upon the considerable scholarly research and resources available in RAMM, I contribute to the design of a game project that results in the creation of *Minecraft* maps which recreate different versions of the city of Exeter through the ages, as well as location-based events which combine gameplay with the original objects included in those maps.

Incorporating the Museum Collection into Game Worlds

The purpose of this section is to determine the rationale behind using game worlds and location-based gameplay to augment and transform the objects in a museum's collection, in order to inform the strategies that can be used in that process. The word augmentation here refers to the expansion of an object's information space by overlaying digital information into it, a concept adapted from the designation of augmented reality as physical space or objects that are expanded by the superimposition of digital information (Milgram and Kishino, 1994). From high quality digitisations, to social media, to virtual environments, a variety of digital technologies have been employed by museums to provide information to visitors and ensure that different types of experience are available to them, responding to the different needs and engagement preferences of visitors (Parry, 2010). More than an exhaustive study of all digital technologies used by museums for this purpose, this section is an overview of the digital augmentation strategies that can be identified as having parallels to game technologies, including the digitisation of objects, the creation of virtual worlds, and using social media to encourage contributions from the community. By identifying the aims, advantages and limitations of the strategies currently used for these purposes, it is possible to recognise the potential for the application of game design to improve this process of augmentation. To that end, I examine examples of the use of digital technologies to augment objects and collections in museums, extending the information space associated with those objects and the possible ways of interacting with them, as well as increasing the visibility and accessibility of those objects to visitors. I then identify the game technologies and

game design strategies that can be incorporated into these procedures, justifying my choice of a specific sandbox game, *Minecraft*, as the main tool to be developed and analysed in this chapter.

The Museum Collection

Objects are a key component of the museum experience. The objects that make up a museum's collection are an important part of that museum's identity, and influence the choice to visit that particular museum's physical and online spaces. In order to increase the visibility and accessibility of those objects, instead of relying on the chance for visitors to come across a specific object, museums employ several strategies, such as organising galleries around specific topics, highlighting objects with special displays, sharing and highlighting them online, using blogs or social media, organising guided tours, among other possibilities. For various reasons, including fragility and conservation efforts, most objects in a museum's collection are not on display in their physical galleries, but they can be on permanent display online. However, even if an object is visible to visitors, not all the information and resources around it can be part of the physical exhibit.²² Digital technologies help solve this issue by expanding the virtual space around an object so that it holds potentially limitless amounts of information and resources. Moreover, in terms of experience, even if objects are on display, most are behind glass or unable to be touched or interacted with beyond visual study, so the types of interaction and engagement available to visitors are limited. In the so-called experience economy, an economic and cultural context where experiences are increasingly valued (Pine II and Gilmore, 2011 [1999]), museums have recognised the importance of diversifying and improving the experiences available to visitors. The application of digital technologies to augment objects in the museum's collection gives visitors a more diverse experience than that possible when information is limited to the physical space of the museum, thereby diversifying and improving the types of learning and engagement available to them.

²² Some museums rely heavily on providing support to visitors in the form of labels or screens, while others focus on letting visitors experience the object and create their own interpretation, unencumbered by educational materials. This is the focus of a discussion referred to as 'experience versus interpretation', which is particularly lively when it comes to exhibiting fine arts (Serota, 2000 [1996]), but can also be found in other types of museums. No matter where in the spectrum a given institution falls, the exhibition space is usually insufficient to house all the information that a museum has about what is on show.

Digitisation - the conversion of physical objects into digital form - is a common practice in museums, from the documentation of objects and gallery spaces with high-quality photographs, such as the ones from Google Art Project, to the three-dimensional scanning of objects into interactive models. The resulting digital artefacts, which can be accessed online or in-gallery, allow visitors to study objects in more detail than it would be possible to have within the museum, either because objects are not on display, or because they are behind glass and cannot be manipulated and studied closely. Three-dimension scans of objects can be examined, moved, and interacted with in ways that are not possible with the original objects. For example, the online platform Sketchfab houses many 3D models of museum objects, including ancient sculptures from the collections of the British Museum, among other museums.²³ The models can be rotated, seen from afar, studied closely, and manipulated in other ways. 3D printing technologies, which have become more commonplace, diverse and affordable in recent years, take this increased access and interaction back to the physical level.

Digital technologies can also be used to create augmented reality environments, that is, physical environments overlaid with digital information (Milgram and Kishino, 1994), such as mobile applications that superimpose photographs or other visual information on top of the real-world images that the device's camera is pointed at, or by making missing objects and built heritage visible by augmenting the space and objects (Bannon, Benford, Bowers, and Heath, 2005; Benford and Giannachi, 2011). Augmented virtuality, on the other hand, refers to virtual environments overlaid with real-world objects and information, such as virtual worlds embedded with digitisations of physical objects. In all of these cases, 3D scans add a new layer of interaction to objects, but the scans alone do not necessarily create a structure or guidance for that interaction. However, these digitisation efforts have advantages for game designers and other creatives, as they result in digital assets that can be incorporated into virtual and mixed reality environments.

Virtual environments and virtual worlds, which allow the addition of 3D-based environmental context to abstract information, are of particular interest to this

²³ See <https://sketchfab.com/britishmuseum> (accessed October 2018).

investigation, as the lessons learned on how they make activities more immersive and meaningful (Christensen, Marunchak, and Stefanelli, 2013, p. 132) can be useful to understand the use of game worlds. Virtual worlds such as *Second Life* (Linden Lab, 2003) have been adapted for various uses, supporting a range of social interactions, from commerce, to education, to cultural events and lectures, and everything in between (Wilkinson and Weitkamp, 2016, p. 153). Although its popularity has waned in recent years, it was useful as a platform for institutions to experiment with 3D virtual worlds (Urban, Marty, and Twidale, 2007). Like the internet, these virtual worlds can be readily available at all times if their creators choose to make them so. Besides being accessible, they are also conducive to collaboration because they are open to everyone with an internet connection, rather than being geographically bound, enabling participants to potentially interact with people who live anywhere in the world, and who may also have limited mobility or opportunity to otherwise engage in social opportunities (Wilkinson and Weitkamp, 2016, p. 153). Many museums have experimented with having a presence in such environments, taking advantage of their potential for socialising, fostering creativity, and allowing people to step into a technologically exciting new world related to the museum. Early examples of virtual museums tended to mimic their real-world counterparts through the use of replicas of the buildings, digitised artefacts, labels, museum shops, and even tours and lectures, in an attempt to draw visitors in the same way they would with real-world visitors, with a smaller number creating more experimental opportunities for interaction (Urban et al., 2007).²⁴ Often, museums developed social activities such as lectures and collaborative builds, in which resources and responsibilities began to be shared between the museum and the community.

The use of digital technologies also allows museums to open themselves and their collections up to contributions from visitors, who can share comments, questions, links, pictures, videos and other content online, contributing to the

²⁴ Examples of museums that have created presences within *Second Life* include the International Spaceflight Museum, with exhibits such as 'a replica of the lunar landing module, photo galleries, and a large ring circling the island on which a series of rockets and other spaceflight vehicles are displayed' and the Louvre Museum, which created a detailed replica of a museum wing in which to display classic and modern works of art. Some experimented with the unique capabilities offered by the virtual world: for example, 'visitors to the Sci-Fi Museum can visit a "Star Trek Holodeck," selecting from a menu of possible objects and then entering the Holodeck to view the object they 'created'', while in the International Spaceflight Museum they can take a rocket ship ride into space (Urban et al., 2007).

information space around objects. For example, using social media, visitors can share photographs and videos of certain objects they have seen, together with their thoughts and experiences, as well as participate in activities that the museum organises on Facebook, Twitter or other websites, or on-site activities whose results are then shared online. These are often, though not necessarily, about specific objects or otherwise based on the museum's collection. The presence of visitors and their contributions is necessary to generate meaning and content in virtual spaces, whether websites, social media, or virtual worlds, which are effectively empty without interactions from participants (Power and Teigland, 2013, p. 3). However, as Nina Simon says when exploring the concept of the participatory museum, it is not enough to give visitors the tools to participate (Simon, 2010). Participation is facilitated when institutions give participants guidance, especially when it comes to projects that involve visitors collaborating with strangers (Simon, 2010, p. 22). Giving visitors guidance on what to create, or letting them join in an ongoing creative project, may be more effective than expecting them to contribute something on their own. This knowledge is useful for the implementation of game design in museums, as it supports the idea that the limitations that games impose, as opposed to free play, are beneficial for fostering creativity, and it gives guidance on the potential format for participatory projects involving the creation of game worlds.

The use of digital technologies to augment collection objects has the aims of accommodating increasing amounts of data and information surrounding objects, improving accessibility to those resources, fostering participation and collaboration, and diversifying the ways that visitors can interact with the objects. From the examples mentioned, it is possible to see limitations that game design can address. Many of the technologies mentioned are made available to visitors to use without guidance, that is, they are tools, not structured experiences. While some visitors may create their own goals for the use of these tools, others will be left feeling lost as to how and what they can use them for. For example, if virtual worlds exist as spaces that people can visit, without giving them goals or guided activities on what to do and what to create therein, visitors may do little more than look around and eventually leave. Game design can address this gap by giving visitors activities to engage in, which can take the form of exploration, quests, treasure hunts, challenges, and other elements found in game worlds.

The Collection and Game Design

Game design can be used to build upon existing practices to augment collection objects in museums. The virtual space associated with collections objects can be expanded to include game worlds that create playable simulations of those objects, which can be visited and interacted with by players, or game contexts which are populated by those objects. The space of game worlds is similar to the 3D virtual environments mentioned previously, in that these worlds are highly sophisticated in terms of audio and graphic capabilities, built with 3D technologies, and available for players to enter as downloadable environments or online persistent worlds that change independently of the players' presence, to be visited concurrently by anyone in the world, who are then able to interact with each other in real-time. The main difference between them is that game worlds have additional interactive features that allow visitors to engage in gameful activities, rather than simply being available for visiting, exploring, and socialising.

Today's sophisticated online game worlds, and their interactive features, have other precursors beyond virtual environments. Their origins can be traced back to multi-user dungeons (MUDs), text-based environments created in the 1970s by Roy Trubshaw and Richard Bartle, which allowed players to engage in adventures inspired by Dungeons & Dragons (Urban et al., 2007). In the following decade, object oriented MUDs (called MOOs) allowed players to create and modify environments within those game worlds, which is when they began to be adapted by players to diverse ends, as well as by educational and cultural institutions (ibid). In the 1990s, with the widespread adoption of the internet, multiplayer gaming became possible (Egenfeldt-Nielsen et al., 2009, p. 79), and with the development of 3D technologies, persistent game worlds such as *Ultima Online* (Electronic Arts, 1997) emerged. While these virtual spaces have, in recent years, waned in popularity or been closed altogether, they have been replaced by spiritual successors such as the fantasy-based, massively-multiplayer online roleplaying game *World of Warcraft* (Blizzard Entertainment, 2004) and sandbox game *Minecraft* (Mojang, 2009). In game worlds such as *World of Warcraft*, players are free to decide where to go, what to do, and how to socialise, but the gameplay experiences they offer are more constricted and linear than those of games such as *Minecraft*, which is considered a sandbox game, more similar to free play spaces in that it encourages players to engage in

emergent behaviour less constricted by rules (Sicart, 2014, p. 51). These sandbox characteristics, while giving players a less guided experience, mean that these games are more malleable and adaptable by institutions such as museums, which can then use them to build more guided experiences within the game world.

Created by Swedish game developer Marcus Persson, developed and published by his company Mojang, and currently owned by Microsoft, *Minecraft* is an open-world sandbox game with no story, low combat, pixelated graphics, and no goal beyond surviving and building. The game mechanic is gathering materials from the game world and building new structures and tools by combining these materials and setting them into the game world. Initially, the game gave very little guidance to players on how to craft new materials and build structures; nevertheless, it became popular from its first released version, before it was officially released in 2009 (Wingrave et al., 2012, p. 2340). The current version of *Minecraft* has survival and story modes, as well as a creative mode, which has the most potential as a sandbox game world. Since it first appeared, the creative mode has been appropriated by players as an almost blank canvas in which they can build anything, within the limitations of the game world. These creations are often shared online by their creators, in the form of downloads, videos, and screenshots, in dedicated communities or social media pages. Players have created add-ons and mods, that is, custom tools that expand the game's capabilities, for example, by allowing more control over textures and graphics in the game. The space of games such as *Minecraft* encourages player creativity, as well as social interactions and the creation of player communities, more directly than online games such as *World of Warcraft*. Its ease of use, current popularity, especially among children, and the existence of an educational version specifically for learning and engagement in not for profit institutions, makes *Minecraft* a useful tool for the creation of game worlds to augment objects in a museum's collection.

In terms of space, *Minecraft* offers its players a game world that, while three-dimensional and navigable, is pixelated and unrealistic. This means that, unlike other more realistic game environments, the focus is less on visual detail and more on creativity with constraints, in a building process that can be compared to playing with building blocks. In the case of museums, I identify two main ways in which objects can be incorporated into game worlds: by transforming those

objects into playable environments, and by creating environments based on appropriate contexts for the objects and populating them with those objects. The architectural and environmental setting inside a game can be related to the collection object in question, for example, by creating a replica of the object inside the game and placing it into its original context, and the objects and characters that populate the game world can also be used to add further information, and therefore facilitate learning and engagement. The digitisation projects that have been carried on in museum collections can serve as facilitators for this process, by giving museums content that can be imported into the game world and made part of storytelling and gameplay practices. This leads us to the main game mechanic that can be incorporated into the gameplay in these game worlds: exploration through navigation, possibly guided by the use of narrative, non-playable characters, quests, and other game elements.

Creativity is at the heart of the culture that encourages game players to become producers. This culture has been studied by several authors. Jon Dovey and Helen W. Kennedy analyse the influence of games in new media production, the visibility of participatory culture in games, and how game editors ushered in new ways of consuming intellectual property which benefitted both the players who wanted to make creative work, and the developers by contributing to community and brand loyalty (Dovey and Kennedy, 2006). Henry Jenkins (2006) with Mizuko Ito and Danah Boyd (2015) study the phenomenon of players becoming producers as part of a larger participatory culture in which consumers create, instead of just experiencing, content. These ideas resonate with the concept of participatory museum (Simon, 2010), in which members of the museum community are encouraged to contribute more actively and creatively to the activities and contents in the institution. When it comes to players as producers, the creation of content can happen inside games, in practices such as modding (Christiansen, 2012, p. 30), or outside games, in the production of *machinima* - cinematic productions using clips from games - Let's Play videos on YouTube, Twitch or other online portals, which show players reacting in real-time to the game they are playing (Vosmeer, Ferri, Schouten, and Rank, 2016), and physical artefacts such as costumes and artwork, among other possibilities. Gaming for an audience, a practice which started in game arcades, is now a potentially profitable endeavour which has moved to online spaces, in which hundreds of

viewers can watch and interact with players engage with a game in real-time, or to physical spaces where players gather to engage in and watch competitive gaming. The reasons for people to want to watch others play include learning to play the game themselves, enjoying the player's performance as entertainment, or using it as an opportunity to socialise with other people in the audience (Vosmeer et al., 2016). These motivations contribute to the creation of a creative community around videogames, and can be leveraged by museums to foster engagement.

Gameplay in *Minecraft's* creative mode happens through exploration, collaboration, and most importantly, through building and intervention upon the environment. Exploration of the game world is free within the structure provided, and the player discovers more about the environment and how it works as they navigate the space. The creation of content inside the game, either collaborative or individual, so that it can afterwards be shared outside the game, is something very common in *Minecraft* projects. In the case of *Minecraft*, this community is well-developed, as the game design shapes the players' behaviours towards not just exploring, but building, destroying and re-building the environment, and developers encourage players to build their own creations, which they can share in dedicated websites for other players to download (Christiansen, 2012, p. 30). These communities sometimes evolve into more organised groups of creators, as was the case of Blockworks, the *Minecraft* team of builders with which we partnered to create maps that augment objects in RAMM's collection. Museums can tap into this creative processes and sense of community through the organisation of game events, as evidenced in this chapter's case study. The process and results of building projects are often documented through screenshots or gameplay videos, or talked about in blog posts or podcasts, and these documents are shared with other players and non-players through online media. These documentation activities encourage reflection on the player's actions, and also encompass other abilities such as creative writing, audio and video editing (Lim, 2009, p. 9). YouTubers and other creators who engage in this sharing process often become popular among players (MacCallum-Stewart, 2014, p. 148). This community of creators who encourage and support each other is an important part of *Minecraft's* appeal, and should be taken into consideration when developing projects using this game.

The versatility of *Minecraft* led to its adoption in different contexts. The game's popularity for educational purposes resulted in the developers releasing *MinecraftEdu*, a version of the game tailored for schools and other institutions. The use of *Minecraft* for educational purposes follows the popularity of games based on encouraging players' creativity to build objects, such as the Danish LEGO bricks, which became popular among those who advocate active play as a means of development (Fanning and Mir, 2014, p. 39). Motivating players to learn through fun, play, and by interacting with and building new content is something that *Minecraft* is well placed to do (Wingrave et al., 2012). Learning by doing is one of the main concepts behind constructivism, an educational theory associated with creativity, personal construction of meaning based on prior knowledge, multiple outcomes, and active engagement, whose adoption in museums encourages interactivity and participation from visitors and legitimises play for learning (Hein, 2001). *Minecraft* is an appropriate tool for constructivist learning because it supports knowledge acquisition through active construction of objects, application of concepts and three-dimensional freedom of exploration. Moreover, it allows the recreation and simulation of real-world environments in which activities can be conducted, as well as varying levels of detail and complexity for these activities, in environments which can accommodate multiple users, collaboration, synchronous activities and chat, and different roleplaying experiences, which translates into each player constructing their own journey and narrative (Brand, de Byl, Knight, and Hooper, 2014, pp. 60 - 61). This supports the use of the game in museums as an engagement tool that is also potentially useful for learning purposes.

In this section, I introduced and examined some of the digital technologies that museums employ to augment collection objects. I identified the game elements that can be used to improve this augmentation, including the use of expressive game worlds which can be explored and populated with objects, encouraging the formation of creative player communities, and giving players challenges and other activities to be completed inside those worlds. I introduced the sandbox game *Minecraft* as a tool that museums can use to achieve these aims, either recreating objects inside the game, or transforming them into game worlds that can be visited and interacted with, adding a layer of gameful interaction to those objects.

I propose that using game worlds is more advantageous than other digital technologies, as the addition of gameful interactions increases players' motivation to engage, augments their enjoyment while interacting with objects, and inviting players to create their own content adds to the social potential of gameplay. Moreover, these game worlds can become part of location-based events which incorporate gameplay into the museum, allowing players to interact with objects both in game worlds and in the physical space of the museum. The next section is dedicated to the analysis of museums that have developed game worlds around objects through the use of *Minecraft*, as well as my perspective as a player-researcher of those applications, followed by the development and analysis of the case study designed for RAMM.

Key Examples: *Tate Worlds* (2014 - ongoing) by Adam Clarke, various *Minecraft* builders and the Tate Museum

At the time of this writing, several cultural institutions have started to use *Minecraft* game worlds to motivate their communities to play and exercise their creativity. In this section, I conduct an analysis of an early and influential example, *Tate Worlds*, a set of *Minecraft* game worlds inspired by objects in Tate's collection, in order to learn about the design strategies used to create these experiences and their effects on visitor engagement, and identify lessons that can be applied when creating the design for the case study for RAMM. While examples of the use of *Minecraft* in cultural institutions are relatively recent, there are other examples that could have been included in this section.²⁵ During the process of exploring the field and selecting examples to play and analyse, I made the decision to focus on projects that involve the augmentation of collection objects using the game, as opposed to, for example, projects that involve recreating the museum's building inside the game.²⁶ *Tate Worlds* represents one of the earliest and most comprehensive examples of a museum using *Minecraft* to transform objects into game worlds.

²⁵ For example, earlier versions of this chapter included an analysis of the Liverpool Biennial's *Minecraft Infinity Project* (2016), which was later removed as it did not fit the criteria of having been created by a public museum to augment collection objects.

²⁶ As an example, the Victoria and Albert Museum commissioned Blockworks to create a *Minecraft* recreation of their Exhibition Road entrance, which can be downloaded from: <https://sketchfab.com/vandadigitalclassroom/collections/digital-kids-imagine-build-and-reveal-2017> (accessed 4 November 2018).

Tate Britain began to consider *Minecraft* as a community engagement tool following a growing willingness to experiment with new technologies to further the institution's mission of disseminating and improving public knowledge about their collections. Tony Guilan, Multimedia Producer for Tate, launched the IK Prize competition, an annual financial and development award presented to 'an idea that uses digital technology to innovate the way we discover, explore and enjoy British art in the Tate collection' (Tate, n/d-a). One of the four shortlisted projects that year was *TateCraft*, a proposal created by Adam Clarke, then working as a freelance artist and producer within the *Minecraft* community, who maintained a YouTube channel dedicated to sharing tutorials and videos related to the game.²⁷ Clarke had already collaborated with a museum prior to being involved with Tate, when his recreation of Hadrian's Wall was featured at Tullie House in Carlisle, in a *Museums at Night* project (Maunder, 2017), an early example of building and exploration activities inside the game connected to objects and creative endeavours outside of it (A. Clarke, 2013). According to Clarke, the idea behind *TateCraft* was to use '*Minecraft* as a tool to create immersive art history projects that can be experienced' by allowing players to walk into them (ibid). While the proposal was not selected as that year's winner,²⁸ Tate Britain later decided to pursue the project and commissioned Clarke to produce several playable maps inspired by objects in the museum's collections.

TateCraft was re-branded *Tate Worlds*, an educational project targeted towards 8 to 16 year-old children, with the first map released online in November 2014 (Styles, 2016). The maps in *Tate Worlds* are playable 3D virtual worlds inspired by specific artworks in Tate Britain's collections. These are not meant to be faithful recreations of the collection objects, but environments that build upon the essence of the originals and remediate them into worlds that can be explored and interacted with. The first map drew inspiration from the *The Pool of London* (1906) by Fauvist painter André Derain. Created in the bright colours of the original oil painting, the world features several London landmarks in the area around the river Thames depicted in the artwork, such as the London Bridge and the Tower

²⁷ An example of the culture of player creativity around videogames, Clarke collaborated with notable YouTuber Joseph Garrett in the form of his popular *Minecraft* character, Stampy Cat, to produce *Wonder Quest*, an online show for children.

²⁸ The 2014 winner was *After Dark* by The Workers (Tommaso Lanza, Ross Cairns and David Di Duca), in which robots equipped with cameras livestreamed video from Tate Britain's galleries at night, controlled and watched by people around the world (Tate, n/d-a).

of London, which can be explored in a quest that has players in search of pigments needed by the artist to create his paints (Tate, n/d-e). Through the use of Fauvist colours, and by making the artist and his paints the primary focus of the quest, this map and its mini-game embody not just the painting, but also information about the artwork and how it was made.

The second map is inspired by Christopher Richard Wynne Nevinson's *The Soul of the Soulless City ('New York - an Abstraction')* (1920), taking players on a rollercoaster tour of New York City. The map attempts to recreate the audio-visual experience of the artist as he visited the city for the first time, the city's evolution into the future as skyscrapers are being built, and the Futurist style of the painting through the focus on technology and fast travel along a bustling metropolis. The sepia colour palette of the environment is drawn from the original painting's tones. The third *Tate Worlds* map released represents a different strategy from the first two. It is inspired in a mixed media artwork, Peter Blake's *The Toy Shop* (1962), which includes glass and painted wood (Tate, n/d-f). The team took this opportunity to create a more detailed and densely populated world that can be played in both single player and multiplayer modes, as opposed to the other maps, which are focused on single player gameplay. In this map, players drink a shrinking potion to allow them to visit and explore inside the various toys in the shop window. This map features mini-games and activities, some of which can be completed in cooperation or competition with other players, when played in an online multiplayer server. According to the description in the map's website:

Meeting exciting characters along the way, players dress as superheroes and fire arrows at targets, but they must be careful not to get caught by any of the scarier toys. Using a grappling hook to scale the shelves, they search for objects, complete challenges and collect the activity badges needed to complete the game. To guide players on their journey, *Minecraft* explorer cat Stampylongnose has some useful tales to tell. Find the old-fashioned records scattered around the toy shop and place them in the jukebox to hear Stampy's words of wisdom. Collect all twelve records to receive the final 'disc jockey' badge. (Tate, n/d-f)

The popular YouTube character Stampy Cat, or Stampylongnose²⁹ acts as a guide through the environment, telling players about details they might have missed and giving them contextual information about the artwork and the artist,

²⁹ As of January 2019, Stampy's YouTube channel has over 9 million subscribers: <https://www.youtube.com/user/stampylonghead> (accessed 20 January 2019).

such as Peter Blake's criteria to choose the objects to include and their respective pop culture references (Tate, n/d-f). The addition of this narration, together with the more numerous and diverse activities, makes this map more interactive than the previous two. Finally, the last two maps still to be released at the time of this chapter's writing are the Surrealist maps (Tate, n/d-d). Unlike the previous maps, these are not based on specific artworks or artists, but instead draw inspiration from the Surrealist movement to create dream-like environments. The first of these maps also differs from the others as, not just downloadable for single player use, it is available to visit as an online server, privately hosted by Hypixel, a group of *Minecraft* creators, with whom Tate collaborated for the creation of this particular map (Tate, n/d-b). In order to assure the safety of players, in particular children, the server disables communication between players, who can therefore see each other's avatars but not interact or communicate. The aim of this map is to give players an experience of what it might be like inside the mind of a Surrealist artist.

The second map is a recreation of the Latitude Festival 2015 re-imagined through a surrealist lens. Built in collaboration with festival-goers, it features 'Latitude's own coloured sheep as giant floating monsters, a typewriter stage, a Dali-esque long-legged creature, a climbable harp and more' (Tate, n/d-c), in ways that play with perspective and scale, and encourages players to explore these creations as well as add their own. These maps are less interactive than the previous ones, but they encourage players to be creative and build additions to the environment, which is something that the previous maps did not do. The two upcoming (at the time of this writing) maps in the project will be inspired by less recent artworks in Tate's collection, the paintings *Carnation, Lily, Lily, Rose* (1885-6) by John Singer Sargent, and *The Destruction of Pompeii and Herculaneum* (1822) by John Martin.

Tate Worlds represents an early example of the remediation of objects through the use of game design, allowing players to explore and interact with those objects as playable game worlds. Devising how successful these *Minecraft* maps have been in conveying interpretation and fostering engagement with the museum and the collection is difficult from an outside perspective, as the museum has not published many findings about the project. From my point of view as a player-researcher, the maps feel effective in conveying interpretation through

their environment, through the use of colours and materials inspired by the original objects, together with written instructions and audio narratives. The structure created through the use of challenges and goals helps guide activities inside the map. The maps seem more effective for learning about the original objects when the gameplay is related to the artwork or artist, which is a design technique that Tate follows in the creation of games (Jackson, 2011, p. 542). There is variation among the maps in the use of strategies for interactivity: sometimes the player is given tasks to complete that are directly related to the ideas behind the artwork, as is the case of *The Pool of London* and *The Toy Shop*, making the connection between collection object, game world and game tasks more readily grasped; other times, as in *The Soul of the Soulless City*, gameplay is more experiential and less interactive, making the connections between map and object less obvious. In the case of the Surrealist maps, they take advantage of the creative building capabilities afforded by *Minecraft*, but are less directly related to specific objects, instead focusing on conveying a general idea about what Surrealism is. They are directed towards building and creativity, while the other maps encourage exploration and engagement through mini-games. However, even in the maps less focused on building, if players wish to do so, they can ignore the mini-games and just explore and intervene upon the environment. This freedom and potential for creative expression is one of the benefits that *Minecraft* game worlds have in comparison to other virtual worlds, and to the regular experience of an object during a visit to the museum.

Considering the potential for social play and collaboration, there are differences between primarily single player and multiplayer maps, and the use of events as a way to bring the community into the museum and engaging with both the game and the objects. In a privately hosted server, as is the case of the first Surrealist map, the opportunity for interaction with other players is restricted, so the experience, while still technically multiplayer, loses the potential for social play. However, in locally hosted multiplayer servers, players can play with their friends or other selected participants, and so have the fully sociable experience of communicating and building together, a possibility that exists whether the maps were created for multiplayer experiences or not. This facilitates the potential creation of a community around the game and makes it a more collaborative experience. This community building is not limited to online space: as part of the

project's promotion, the maps were presented at several events dedicated to museums or games, and links to the maps were shared on the museum's social media accounts, inviting the community to download them and share their creations. One way to encourage social play is to have on-site activities in the museum that are specifically designed to foster a sense of community and, potentially make it location-based through the creation of bridges between digital and physical spaces. For example, activities could be organised that allow players to look at the original objects and play the game worlds alongside those objects. As it stands, while information about the original objects is included alongside the links to download the maps, it is not clear if and where those objects are on display physically, so as a player I had little motivation to go to the museum to further engage with these artworks. Nevertheless, *Tate Worlds* is a pioneer project in the work that I study in this chapter, and informed subsequent *Minecraft* projects in museums, both in terms of the people involved, as Adam Clarke and several of the builders have been involved in different projects since, and the strategies used.

Several design strategies and game elements from this project can also be found in the *Museum of London's Great Fire 1666 Minecraft* maps, which were commissioned to the same team that was involved in *Tate Worlds* to accompany the museum's commemorative exhibition, and which I visited and analyse in the next section as a player-researcher.

Case Study as Player: *The Great Fire of London* (2016 – 2017) by Adam Clarke, Dragnoz, Blockworks and the Museum of London

My focus as a player-researcher for this chapter is the Museum of *London's Great Fire 1666: The Great Fire of London in Minecraft*. In 2016, to mark the 350th anniversary of one of the most memorable and devastating events in the city's history, the Museum of London organised an immersive exhibition on the subject, accompanied by an extensive parallel programme with talks, events, and digital projects. The curators collaborated with Adam Clarke, Blockworks and *Minecraft* creative producer Dragnoz in order to develop an ambitious set of *Minecraft* maps to accompany the exhibition. I had the opportunity to visit the temporary exhibition with which these maps are associated, prior to engaging with the maps as a player-researcher. According to Museum of London curator Meriel Jeater, *Fire! Fire!* was an exhibition specifically designed with families and young children in

mind (Jeater, 2016). While I am not part of the target group for these experiences, visiting the exhibition and playing the game allowed me to have the full experience and perspective on how the maps connected to the physical space and objects they were created to accompany.

The interactive exhibition made use of multiple media to immerse visitors in London at the time of the fire and its aftermath. The fire began on the early morning of 2 September 1666 and raged for almost five days, destroying three quarters of the city and leaving thousands of people homeless (Museum of London, N/D). The exhibition told the story of how the fire started in a bakery and quickly spread from house to house due to atmospheric conditions, the building materials of the houses, the organisation of the medieval streets, and the lack of an organised fire brigade to combat the spread of the fire (ibid). As a result of the disaster, thousands of houses, churches, and landmarks such as St Paul's Cathedral were destroyed. The damage to the city took nearly fifty years to rebuild, including the redesign of street layouts and building regulations, to prevent similar events from happening in the future. From then on, houses were built out of brick instead of wood, streets were wider, a fire brigade was set up, and public services such as pavements and sewers were improved (ibid). The story of the event was told throughout the exhibition using various curatorial techniques, including immersive recreations of physical environments such as the Pudding Lane bakery, where the fire started, interactive exhibits that incorporated sounds, smells and textures, and an animation of the spread of the fire projected onto a giant loaf of bread, alongside more traditional exhibits of objects from the Museum of London's extensive collection of objects and documents related to the fire. These objects included news items, charred household artefacts left behind by those fleeing their homes, firefighting equipment, witness reports, correspondence and regulations from the aftermath, among others. The result was an evocative depiction of the event, the experiences of the people involved, the devastation and subsequent recovery (see Appendix A.1.4).

The curators' intent was to create the feeling of being immersed in the story being told by the exhibition, while keeping it abstract enough that it would not frighten the younger members of families, their primary visitor target group (Jeater, 2016). The use of *Minecraft* and its pixelated graphics means that the game worlds

created were immersive, but not too realistic, allowing players to maintain a distance to the events that they are immersed within and interacting with. This means that they could simultaneously experience the event as if they had been part of it, but in a way that does not fool them into believing they were there, which prevents the experience from becoming distressing. Jeater also mentions the intention to focus more on the personal impact of the events on the lives of Londoners, instead of the more traditional approach of focusing on how the fire impacted the city structurally, in order to highlight the human side of the story and the resilience of the city's inhabitants (Jeater, 2016). The exhibition's organisers wanted visitors to understand how Londoners felt while the fire was raging, how they tried and eventually succeeded in fighting it, the impact on people's lives, and how the city was rebuilt. To achieve this, the team used the objects in the museum's collection, as well as diaries, letters and other records from witnesses, to bring their personal experiences closer to the visitors. They also put the visitors into the middle of the event, by creating large-scale interactive exhibits that allowed them to physically combat the fire and rebuild the city, among other activities. This emphasis on empathy and interaction were aided by the experience within *Minecraft*, which puts players into the shoes of someone who is in the city, interacting with historical characters, trying to deal with the fire as it appears and spreads, and later joining in the reconstruction efforts.

The Museum of London commissioned a total of three *Minecraft* maps to accompany the exhibition (see Appendix A.1.5 for gameplay notes). They decided to make them available as downloadable files that could be imported to each player's local servers, instead of hosting the servers themselves. The first, a map of London in 1666 before the fire, was made available for download in July 2016, followed two months later by the map that put players in the middle of the fire as it was spreading throughout the city (Museum of London, 2016). The third and final map, depicting the rebuilding efforts of the city after the fire, was released in March 2017 (Museum of London, 2017). Some of the objects included in the exhibition, such as the 17th century fire engines, can be found inside the game maps. Some of the maps also include historically accurate non-playable characters who add to the ambience while conveying information to players about the events, dangers and other details that can be found in the environments, as well as providing guidance on what to do and where to go within the map.

The first map, titled the *Pre-fire London* map, is a depiction of seventeenth-century London, complete with reproductions of St. Paul's Cathedral, the Roman walls, and the Tower of London, and historically accurate boats in the River Thames, all of which can be visited. When first accessing the map, players start inside one of these boats, which has a miniature 2D version of the map for guidance, and a gallery that can be populated with quest items, such as paintings, tattered map pieces, and audio records, as they are found by the player around the map. The map is not just a city to be visited and explored, as it also incorporates activities, although these can be ignored by players in favour of free exploration. Similar to the previous experiences mentioned in this section, written instructions are incorporated into the environment, so that the player has some initial guidance on the types of activities and items included in the map. These include the quest items mentioned and audio records scattered across the city, which give context and clues into the causes of the fire. One of these items, which details the start of the fire, can be found in the bakery where the fire started; another, at the top of St. Paul's Cathedral, tells the story of a previous fire, which started when a lightning bolt hit the cathedral. Adam Clarke and the YouTuber Stampy Cat give their voices to the audio records. Beyond giving historical information and context, these audio records also have the effect of offsetting the lack of non-playable characters in this map, an absence which has the eerie effect of making the city of London seem largely uninhabited. The collectable map items aid the players in navigating the city, by showing their positions relatively to the river and the various landmarks. The amount of detail and historical accuracy of the map environment are successful in portraying not just the beauty of the city, but also some of its characteristics which later contributed to the spread of the fire, including the narrow streets and the density of the houses mostly made of wood (see Appendix A.2.2). The result is an evocative portrait of a disappeared city of London, which has the effect of creating a sense of foreboding and anticipation for what the player knows is to come in the next map.

The second map, the *Fire of London* map, was released in 2 September 2016, exactly 350 years after the event it depicts. It is the most detailed and interactive of the three maps, as it includes several mini-games with activities related to the fire, such as evacuating residents and trying to stop the spread of the flames. Players enter the map via a museum-like interior space in which they can choose

which of the three days of the event they would like to engage with. This space is occupied by replicas of various artefacts related to the fire, which can also be found in the exhibition, including a fire extinguisher, a fire engine, a fire hook, a piano, a leather bucket, among others. There are historical paintings on the walls depicting the Great Fire, which belong to the museum's collection and were also included in the exhibition. These objects are accompanied by clickable switches, which when interacted with, open links to the Museum of London's website entries about each object. Once players select the Day One switch, they get transported into a smoke-filled bedroom, where they listen to the sound of coughing. Their first task is to escape the burning house through the window into the streets of the city. The city is populated by many non-playable characters, as well as several known historical figures who the player can interact with, who add to the verisimilitude of the environment, aid in conveying information and advancing the player's quest. There are several ways in which players can try to stop the spread of the fire, including the use of water pumps, fire engines and explosives. Once again, players can choose not to engage in the mini-games, and simply explore the city and see how it changes as the fire spreads. It is a powerful experience to see the detailed buildings and landmarks gradually destroyed as the fire spreads throughout the city. The visual effect is enhanced by the fact that when the player first enters the map, it is cast in darkness, mirroring the historical fire, which started during the night. Eventually, no matter what players choose to do, the entire city becomes engulfed in orange flames.

In the third and final map, entitled the *Rebuild London* map, players return to the destroyed city of London in the aftermath of the fire, and are challenged to take part in the reconstruction efforts. Once they enter the map, they can explore the streets of the ruined city, listen to the proclamation of King Charles II, and talk to the different architects, Christopher Wren, Valentine Knight, John Evelyn and Richard Newcourt, who each formed a vision for the new version of London, with wider streets and open spaces, and who are also mentioned in the exhibition (Museum of London, 2017). Players can listen to these characters' ideas and look at images of their planned projects, and be inspired to create their own version of the city using small-scale models, an activity which directly mirrors inside the game an experience from the physical exhibition. This activity also has the particularity of self-referencing the game, becoming a miniature block building

model inside a block building game. Players are put into the game's Creative mode and given access to several miniature blocks, which they can use to rebuild the model of London as they see fit.

The *Great Fire of London Minecraft* maps are characterised by their size and detail in their depiction of historical London. The Blockworks team worked with the curators and tapped into the museum's documentation and resources in order to create a naturalistic depiction of the city. The items included in the exhibition were recreated as 3D models which were then imported into the maps, as well as shared online.³⁰ The amount of buildings necessary to accurately depict the scale of destruction of the fire presented the team with the task of handcrafting thousands of medieval buildings out of in-game blocks. To solve this, Blockworks enlisted the help of *Minecraft* coder and map-maker Adrian Brightmoore, who created a program that resulted in procedurally-generated buildings to populate the areas of the map outside the centre that did not require individually accurate buildings (M. Davies, 2016). Procedural generation is a technique used in several videogames in order to create random worlds out of a combination of rules. To achieve this, Brightmoore studied the medieval buildings, deconstructing them into their most important elements, such as doors, roofs, floorplans, windows, support beams, and levels, and built a construction ruleset out of the results (ibid). The application of this technique for building inside *Minecraft* has since been adapted for other projects, including this investigation's own case study, namely the *Minecraft* version of the Hedgeland Model of Exeter. However, the most important parts of the maps were still sculpted by hand by the team of builders, both in the London and the Exeter maps.

The *Fire, Fire!* exhibition was separate from the *Minecraft* maps, which were created as an additional, but optional layer of gameful engagement. However, as mentioned, the maps expand the physical exhibition by mirroring several sections of the exhibition: the Pudding Lane bakery prior to the fire, the city as it is burning, and the area with blocks that could be used to rebuild London. Another bridge between the physical and digital sides of the experience is the remediation of historical objects that can be found both in the exhibition and inside the game. The *Minecraft* project was a way of extending the exhibition and the story it

³⁰ The 3D models of the exhibition objects can be found in Dragnoz's Sketchfab gallery: <https://sketchfab.com/dragnoz> (accessed 4 November 2018).

wanted to tell beyond the physical space of the museum, allowing people from all over the world to participate, even though they could not physically travel to London to experience the exhibition. The online availability of the *Minecraft* maps meant that these remote visitors were able to get an interactive, personalised experience of the story, by stepping inside the game. For those who visited the exhibition, there was perhaps a missed opportunity by not allowing visitors to access the maps alongside the objects exhibited, possibly using devices provided by the museum itself, in order to improve accessibility for those who do not own the game or do not own a mobile version of it. This means that the game worlds do not require a visit to the exhibition to be fully experienced, which can be considered a disadvantage if the aim is to motivate players to visit the museum, but has the advantage of becoming an ongoing legacy, as the maps are still currently available to download, even though the exhibition has ended. This means that the resulting game worlds outlive the events they are associated with, allowing the interaction to continue beyond the physical event.

As part of the promotion of the maps, Adam Clarke, as his YouTube persona Wizard Keen, created several *Let's Play* videos about the maps with gameplay footage, and other YouTubers did the same. For example, Solly the Kid, a young YouTuber who was also involved with RAMM for this chapter's case study, made a video that showed him visiting the exhibition at the Museum of London with Wizard Keen and his family, following a tour guided by members of the museum's team (Solly The Kid, 2016b). He also created a *Let's Play* video inside the *Fire of London* map (Solly The Kid, 2016a). Together, these and other videos contribute to the promotion of the project, and in creating bridges between the work of professional *Minecraft* builders and amateur players. The success and popularity of this project is related to the maps' theme, the quality of their built environments and the effectiveness of their game mechanics. The *Great Fire of London* is a well-known story that many people are already interested in and familiar with, and London is an international city famous for its tourist attractions. The events depicted lend themselves well to cinematic presentations of the map, as watching the fire raging through the streets of what is recognisably the city of London is a uniquely evocative experience. The fact that players are put into the role of a Londoner who has to deal with the fire, with a type of roleplay that is action-based, also contributes to creating engagement and interest.

The maps were created to be evocative, immersive and educational. The environment incorporates and communicates information to players in several ways. The depiction of 17th-century London is as accurate and recognisable as possible within the game's aesthetic. Many of the objects from the exhibition were replicated and put into context inside the game, and the tasks that players are given during the fire, such as trying to fight or control the fire and fetching objects for other characters, allow them to put these objects into use, to understand first-hand how they worked and why they were ineffective in combating the fire. Players also experience the evolution of the events from a first-person perspective, directly learning about how the fire spread and about the stories of those affected. The *Great Fire 1666 Minecraft* maps are unique in the sense that they were created as a sequence of maps and events in time. The event of the city's destruction, followed by the encouragement of creation by the players in the form of rebuilding, naturally created engagement with the skills necessary to more efficiently fight the fire and rebuild the city. The action of rebuilding and the choices made regarding the structure and architecture of the city can be carried out within the exhibition, which explains the several propositions made for rebuilding and the one that was ultimately chosen, and then encourages visitors to devise and try out their own solutions. This can also be done inside the game, in a much more sophisticated fashion than that which is possible in the limited physical space of the exhibition. Therefore, *Minecraft* was used to augment the exhibition and the objects displayed by allowing visitors to do things that the exhibits could not. Both the exhibition and the maps succeeded in creating evocative spaces that made visitors imagine what it must have felt like to go through the event, which was one of the objectives of the experience. The exhibition is not an entirely controllable environment, as there are limitations in resources and potential health and safety concerns, which means that a lot of what can be done inside the game worlds cannot be done in the exhibition. The maps allow players to engage in tasks for which they needed an understanding of the objects in order to be successful.

In summary, the Fire of London *Minecraft* project addressed many of the aims that I identified for the use of this sandbox game in museums. The maps were created as an optional layer of gameful engagement in addition to the types of engagement already found in the temporary exhibition. The maps created

immersion within the historical event and empathy with the people affected by it, by giving players a role to play in the events. As a player, I naturally learned while I engaged with the story and activities within the maps, as some of the challenges required me to understand the nature and uses of the artefacts exhibited. Moreover, the project created bridges between the physical and digital content, which meant that, while the maps could be played without visiting the exhibition, the experience benefitted from the synergy between the physical exhibition and the game worlds, offering different perspectives on the same objects and story. The following section in this chapter is dedicated to the design and gameplay analysis of the *Minecraft* experience created for RAMM as part of this investigation, which transforms a collection object into a game world, taking into account the lessons learned from the case studies previously detailed in this chapter.

Case Study as Game Designer: *Minecraft* at RAMM (2017 – 2018)

This section is dedicated to *Minecraft* at RAMM, the case study created for RAMM in the context of this chapter. *Minecraft* was used to recreate an object in RAMM's collection as a game world, thereby allowing players to see the object in the physical galleries of the museum, and then explore and interact with it inside the game world. I begin by describing the background to the experience, explaining why the museum team and I chose this particular object from the collection. I use the conclusions outlined in the sections above to inform the design process. The project shares characteristics with some of the examples explored in this section, its uniqueness coming from the objects used and the particular context of this museum, and the focus on studying the effects of the experience on visitors' engagement and motivation to visit. The resulting game world is the remediation of an object from RAMM's collection, *Caleb Hedgeland's model of Exeter in 1769* (RAMM, 2016). The map was made available for the community to download and modify, both on-site in the museum and online, and different activities were organised by the *Minecraft* creative team during *Minecraft* event days targeted towards children of 6 to 12 years of age and their families. During those activities, I conducted semi-structured interviews with 29 guardians from families with children to determine their family's experience of the object both in and outside the game, and to understand their motivation to visit and the types of engagement that occurred around that object.

The Game Design Process

The design process for *Minecraft* at RAMM followed the same overall format as the one for *The Great Exeter Garden Quest*, with aims, its place in the investigation, a description of the experience, and a timeline; however, it also involved the major difference of involving external collaborators in the form of *Minecraft* creative professionals (see Appendix C.1). This involvement was planned from the beginning as the project was too ambitious to be carried out without external input, due to a lack of in-house experience; for example, my experience with *Minecraft*, while pre-existing as casual player and later player-researcher, was not extensive as a builder. After investigating *Minecraft* creatives based in the UK, Rick Lawrence and I contacted Adam Clarke with a proposal for collaboration, and Clarke subsequently brought on board the Blockworks team. There followed an iterative process of development which included site visits with Clarke, meetings with the Blockworks team and an exchange of emails and documentation to make sure that everyone in the team was up to date with all progress (see Appendix C.2 for examples of screenshots of the work as it developed). Clarke and the Blockworks team added considerable creative contributions to the maps which built upon the initial design brief, such as the decision to use in-game materials that made visible the fact that the map was the remediation of a museum object. These creative contributions were welcome as an important part of the collaborative design process I wished to take part in and analyse. The *Minecraft* map that resulted from this work (see Appendix C.3) was part of a set of activities that enhanced the location-based character of gameplay. These activities were devised by Clarke with the support of myself and the museum staff, with the dual goal of promoting engagement with the maps and allowing me to observe players' interactions with the map and carry out interviews.

The first step in developing a *Minecraft* game world based on a collection object was to work with the digital and curatorial teams at RAMM to discuss the collections and decide which objects would be adequate for this project.³¹ The

³¹ My proposal for a case study using *Minecraft* focused on the recreation of the Hedgeland model as a game world. Due to the museum's interest in continuing to develop work using the game, the *Minecraft* project at RAMM was expanded to include the creation of playable versions of the city across history, including a 1st-century AD Roman Fortress, Roman Exeter between 70 to 350 AD, and 16th-century Exeter. The Roman Exeter maps incorporate objects and resources that are part of the Exeter Time Trail project. Following the recent discovery,

team at the museum was constituted by myself, Digital Media Officer Rick Lawrence, Collections and Audiences Assistant Helen Burbage, Assistant Curator Thomas Cadbury, and Senior Collections Officer Julien Parsons, with input from the rest of the Collections Team and the Audience Development Team as needed. In order to keep the gameplay experience location-based, the object or objects needed to adhere to two criteria: they should be available for visitors to see physically as part of the museum's permanent exhibition; and they should be emblematic of RAMM's collection that could not be found anywhere else. Since the museum's collection is closely connected to the city of Exeter and the surrounding region, we decided to focus on the idea of portraying a historical version of the city of Exeter. This had the additional benefit of increasing the visibility of the city's history and built heritage, an important but challenging goal in a city like Exeter, whose historical architecture has largely disappeared due to demolitions and war time bombardments.

The choice was *Hedgeland's Model of Exeter before 1769*. Built by Caleb Hedgeland between 1817 and 1824, a time when the city was undergoing several demolitions and modifications, this model of Exeter is a record of the city, its streets and buildings inside the confines of the city wall. Hedgeland chose the year 1769 as that was when the first of the city's medieval gates, the North Gate, was demolished, an event which he witnessed as a child. The model is not only an important historical record, but is also, according to the museum, one of the earliest surviving models of any town in Britain. This object is part of the museum's permanent exhibition gallery dedicated to the history of Exeter, and is seen by hundreds of visitors every day, who pore over the detailed model from the distance allowed by its glass case enclosure. Its popularity, uniqueness, connection to the city, and the fact that, in 2017, when this project was launched,

conservation work and display of the Seaton Down Hoard, the museum was keen to develop events and activities surrounding the Roman heritage of the region. The first part of the project, related to Hedgeland's Model of Exeter, was funded by Arts Council England resources allocated to my investigation, while the rest of the maps were funded through a collaboration with the research project *Exeter: A Place in Time*. Led by Professor Stephen Rippon, from the University of Exeter's Department of Archaeology, in partnership with RAMM, Exeter City Council, the University of Reading, and English Heritage, this four-year AHRC-funded research project aims to uncover information about Exeter's importance and development as a Roman fortress and city, by critically re-examining archaeological material excavated decades ago with techniques that were not available at the time (RCUK, 2016). Other resources used include geographic information system (GIS) data from Exeter City Council. The Roman Fortress became part of the events of the second Minecraft Day, during which I collected data regarding engagement of visitors with *Minecraft*, and that data is also analysed here. The other maps were released afterwards and are not included in this discussion.

marked the 200th anniversary of Caleb Hedgeland initiating the model's construction, led to the selection of this model to be transformed into a game world.

Following the first case study of this thesis, which I developed by myself in collaboration with the museum, and the conclusion that the game design process benefits from collaboration with specialised game creators, I decided to contact *Minecraft* creative developers in order to engage their expertise and skills in the creation of the maps. The initial design briefing was created by me, following the aims of the research project, with input from Rick Lawrence to make sure it was aligned with the museum's aims, and later incorporating the suggestions of curator Tom Cadbury regarding the part of the project dedicated to the Roman versions of the city of Exeter (see Appendix C.1). We contacted *Minecraft* creative producer Adam Clarke to lead the project. To create these maps, Adam Clarke partnered with Blockworks, an international team of *Minecraft* players led by architecture student James Delaney.³² Although several of its members had been collaborating in *Minecraft* online servers ever since the game appeared, the company was formally created in 2013 in response to a growing demand from both profit and non-profit institutions to tap into the creativity of teams of players to create *Minecraft* maps for marketing and education. According to James Delaney, at that time, several commercial companies and corporations were looking to 'leverage *Minecraft*'s popularity to sell their products, which was profitable, but then shut down soon after. [...] Because they changed the guidelines of the game, you can no longer use *Minecraft* to sell your products' (J. Delaney, personal communication, 9 May, 2017). Mojang, *Minecraft*'s developers, changed the rules for commercial companies, but continue to allow non-profit institutions to use the game for marketing and engagement purposes, meaning that groups such as Blockworks now focus on projects as the one they developed with Tate. They have also created maps for the Museum of London, the Victoria and Albert Museum, the Royal Institute of British Architects, and UNHabitat, as well as this investigation's *Minecraft* project for RAMM.

The game design brief included guidelines on the creation of *Minecraft* maps and activities based on those maps which connected the game worlds to the original

³² Blockworks' official website: <https://www.blockworks.uk/> (accessed 25 October 2018).

objects referenced. The Hedgeland Model was to be transformed into a playable landscape that could be shared, downloaded, and modified by players, in the museum galleries and beyond. The additional maps of Exeter were to incorporate collection objects into thematically appropriate and historically accurate game worlds. For the Hedgeland map, the decision was made to respect the nature and characteristics of the original object, as a subjective model of a city created by an individual, by using, inside the game, the same materials that Hedgeland used to create the object. This means that buildings such as the Exeter Cathedral, which in reality is made out of stone, were recreated as made out of wood, as in the model (see Appendix C.3 for a comparison). The building team also added the object's glass case to the map, further creating the illusion that the player travels inside the museum object.

**This image has been removed by the author of
this thesis for copyright reasons.**

Figure 3.1: Screenshot of Exeter Cathedral in the process of being built for the Hedgeland model map in *Minecraft*.

Based on the initial guidelines, and following a visit to the physical space of the museum, in which the team studied the Hedgeland model, Clarke devised the final layout of the maps, as well as the types of experiences that would be incorporated into them. Clarke worked with poet and writer Victoria Bennett to create the written content of the maps, and engaged Blockworks to build the maps according to specifications. The building team regularly sent the museum

team updates and screenshots of the progress (figure 3.1; see also Appendix C.2). Once the experience was completed, the maps were shared on the museum's website as downloadable files that players could access in their private versions of the game, and also made available on dedicated computers in the museum galleries during the two *Minecraft Days*. The events that became the *Minecraft Days* were proposed by Adam Clarke as part of the promotion for the maps and the design requirement to create bridges between the maps and the original objects. Clarke proposed organising workshops and building competitions hosted by YouTubers (see Appendix C.4). As the initial decision to have the map permanently playable next to the original object proved problematic for the museum in terms of logistics, the events became the main opportunities to create bridges between the game world and the original object, ensuring that the resulting gameplay would be location-based.

Unlike *The Great Exeter Garden Quest*, the museum's investment in this project was considerable in terms of budget, time and expertise (see Appendix C.1). The project would have been impossible to carry out entirely in-house without the external contribution of specialised skills and time, which - coupled with the world-class quality of the team selected as collaborators, as well as the popularity of the events and the visibility the project acquired over time - eventually offset the lack of online engagement.³³ Nevertheless, the investment required means that these types of projects are challenging for museums on their own, and may only be possible as part of collaborative projects such as this investigation.

The design and development process were straightforward, with constant communication within the team. The biggest challenges appeared during the *Minecraft Days*, the first of which was more popular than anticipated, putting the museum's resources and personnel under stress. The free ticketed activities filled up in a few minutes, leading to many participants feeling frustrated by not being able to take part. On the other hand, outside the event days, the maps did not achieve the levels of engagement hoped for. It is possible this is related to a lack of publicity efforts, a recurring problem which goes beyond game design but

³³ Both I and Rick Lawrence have presented talks about this project in national and international academic and industry events, such as the City Museums Symposium in Porto, Portugal (June 2017) and Exeter City Futures (May 2018).

which I identify as a crucial part of the game design framework formulated later in this thesis.

The Gameplay



Figure 3.2: Screenshot of the Minecraft Hedgeland map showing Exeter Cathedral on the right and Mol's Coffee Shop on the left.

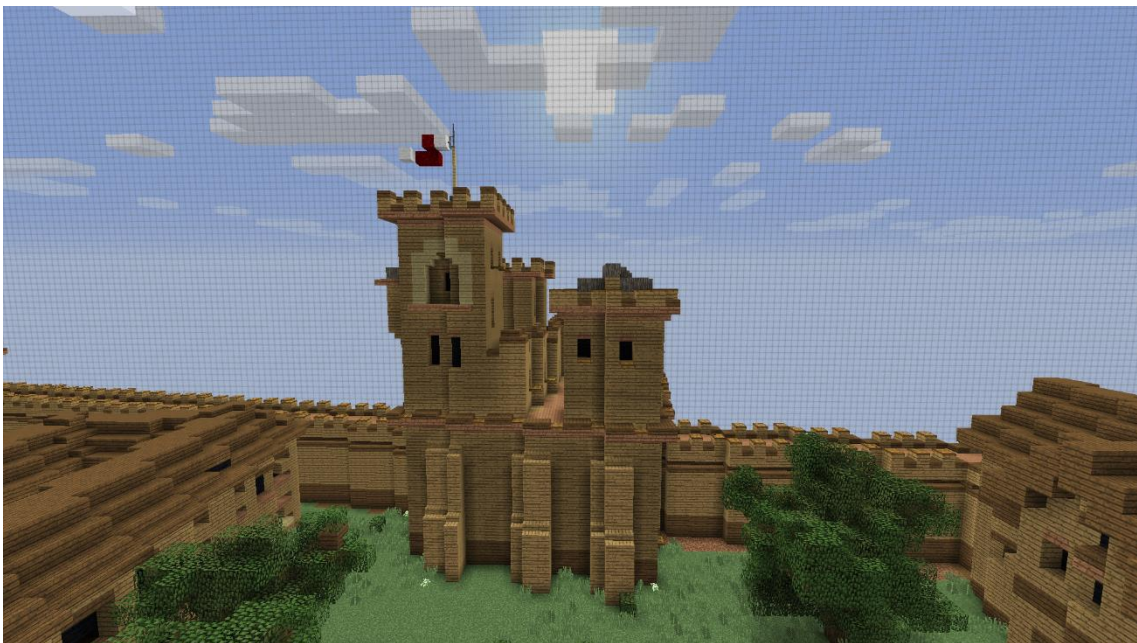


Figure 3.3: Screenshot of the Minecraft Hedgeland map showing the now demolished city wall and the virtual glass delimitation of the *Minecraft* map in the background, in the form of a grid.

This section is dedicated to the description and analysis of gameplay of the *Minecraft* game world based on the recreation of the Hedgeland model. The Hedgeland *Minecraft* map was conceived as the remediation of the exhibited object, which can be visited and seen behind a glass case at the museum's gallery space, into a game world, which can be explored and modified by players (see Appendix C.3 for visual documentation of the map). Players entering the map find themselves outside one of the gates of the city wall, which in the present city of Exeter has almost entirely disappeared. As they make their way to the gate, they come across a non-playable character, Caleb Hedgeland, the model's maker. Upon interacting with him, they can bring into their inventory of objects a book that introduces them to Hedgeland, his life story, and the reasons that led him to create a model of his city. Players can learn how young Caleb accompanied his family to several demolitions of historical structures in Exeter. Seeing his city change around him, he had the urge to document what it looked like for posterity, leading him to create a miniature wooden model of Exeter. Including this information about the object was a deliberate design choice made in order to encourage players, many of them as young as Hedgeland was when he first witnessed the demolitions, to empathise with his need to document his city. Although separated by centuries and using vastly different technologies, the same impetus to document the world can be found behind the making of several *Minecraft* projects, which consist of in-game replicas of real-world places and buildings. It also directly connects the game mechanics of exploration and building to the original object, which is one of the design lessons learned from the examples studied in this chapter.

An additional aim of the project was to use *Minecraft* as a way of making visible the heritage which no longer exists, an important goal in a city like Exeter, which has a rich and ancient historical past that has largely disappeared over the centuries due to demolitions, war and fires. This is one of the characteristics that makes the original object fascinating, and the goal was to build upon that by allowing players to look at the structures, but also play with and within them. Like the model, the map includes structures that have historical significance, namely the Exeter Cathedral, the Guildhall, Mol's Coffee shop, and the Castle, some of which can still be found in the real-world (Figure 3.2; see also Appendix C.3). In

each of these places, more non-playable characters can be found, each with a book that gives players information about that building and the city itself. To give players the feeling that they are entering the collection object, and being allowed to manipulate content that is inaccessible in the physical world, the map includes a virtual glass enclosure delimitating the city (Figure 3.3). Therefore, it is simultaneously a remediation of a real place and of a collection object.

The map was built with engagement and exploration in mind, with the contextual information about Caleb Hedgeland and the city of Exeter included to help players understand the object and the city better. The books and characters were designed as in-game vehicles for conveying information and to promote learning. When adapting information and educational outcomes into a game, there is a risk of creating an experience that looks like a game, but does not feel like playing a game. As mentioned before, the focus of this investigation is on encouraging motivation and enhancing engagement, with learning as a potential secondary outcome. The information included in the map was incorporated in ways that made sense inside the game world, while the rest of the historical content is in the form of the collection object and the buildings in the playable landscape. In short, the map was created as an immersive space where the interpretative materials from the museum could be conveyed as part of the environment and interaction with the elements found therein.

The following analysis of players' gameplay activities, motivation and engagement is based on data collected during two event days, in July 2017 and February 2018, during which I interviewed randomly selected guardians of families who took part in the event (see Appendix C.4). RAMM's first *Minecraft* Day was built around the Hedgeland model map. It involved Adam Clarke, under his YouTube pseudonym Wizard Keen, as well as *Minecraft* YouTubers Solly the Kid, Django Plays, and Geek Dad. Community involvement in the first *Minecraft* Day exceeded the museum's expectations, with between 1500 and 1700 participants, an immediate sign of the effectiveness of having *Minecraft* as a trigger to attract visitors into the museum. The second event day was equally popular. In terms of creating motivation to visit, while the majority of those who visited were repeat visitors, several reported being first time visitors who were attracted to the museum by the prospect of getting involved with *Minecraft* activities, combining their children's pre-existing interest in the game with what

they hoped would be an educational visit to the museum. Participants responded positively to the question regarding their opinions on the use of *Minecraft* as an interpretation tool in museums. In the words of Guardian 8, 'the children would be interested in anything at all, if it were presented through a *Minecraft* format'. Further feedback on this point focused on the fact that using *Minecraft* and other games as a way to attract children to the museum, and involve them in educational activities, can be beneficial for both the museum and the children, and subsequently, their families:

Guardian 3: I think anything that increases [the children's] interest in something, especially history, or knowledge they could learn, it's an invaluable tool. You should use gaming more, I think, for educational purposes. Especially boys. I find, as a parent of three sons, that you really get their interest if it's related to something they're enjoying doing at home, in relation to gaming. It gets their interest, and then you can expand on it with other things. It's a good idea.

This idea that games, and the interaction they encourage, can be a gateway experience to engage young people who might otherwise be reticent to visit cultural institutions, supports the hypothesis that games can be used by museums to attract people who are interested in games, but are not necessarily in museums, and encourage them to actively become part of the museum community (see Appendix C.4.3):

Guardian 4: I think that the only way that you're going to be able to engage this generation, my son's generation, is through things they can relate to. [...] if you can find something that engages them, like the computer games, it means you've got a much better chance of them actually absorbing that kind of data and retaining it, because they're engaged.

SR: Would you participate in similar activities focused in other objects in the museum's collection?

Guardian 4: Yeah, definitely. If it was something that he was keen on and interactive... We do a lot of museum visiting, we do a lot of gallery visiting, we're National Trust members, but the thing that excites him the most is the kinaesthetic practical things that you can engage with. And if it involves anything to do with digital, building, constructing, you know, and obviously, the computer element, then yeah. It makes my life easier because I don't have to drag him around a museum when he's really bored.

As another example, Guardian 8 reported having discussed the day's plans with their children: 'we'll do what we can here [with *Minecraft*], because obviously they can't do everything, and then we'll go have a look in the museum, which we wouldn't have done otherwise'. The game becomes the initial attractor that has

the potential to spark children's curiosity and encourage them to visit and engage with the rest of the museum. *Minecraft* has an existing extensive player base, both for entertainment and education, and data suggested guardians associated the game with positive learning outcomes prior to seeing the game in the museum. Guardian 9, for example, mentioned that *Minecraft* is the only game they allow their child to play, because as 'it uses a lot of imagination, it encourages children to be artistic and creative.' The game's reputation among families as an entertaining and educational tool means that it is a safe choice for museums to incorporate videogames into their experiences.

In terms of engagement, I suggest that building a *Minecraft* map based on a collection object increased that object's visibility and visitors' curiosity to engage with and learn more about it. During the Minecraft Day dedicated to the Hedgeland model map, interviewees who were not aware of the original model's existence became curious enough to search for it in the galleries, and those who had seen it before expressed their interest in seeing how it had been transformed into a *Minecraft* map and visiting it within the game. Most visitors were local to Exeter and described their interest in the object as a three-dimensional documentation of their city, an 'overview of what the city used to look like, and how different it is now' (Guardian 14), in which they and their families could find historical buildings and search for familiar structures and streets. Most participants reported that, prior to their visit during Minecraft Day and the promotional materials associated with the event, they were not aware of the fact that the museum had created a game map of 18th century Exeter based on the Hedgeland model. This supports the idea that creating location-based events within the physical galleries of the museum helps encourage engagement with both the digital and physical content of the institution. Once they became aware of the map's existence, the respondents expressed their curiosity about the project, their intention to download the map once they arrived home, and to explore it with the younger members of their families:

Guardian 14: It's an interesting idea, because it's something real that [the children] can do, rather than just reading about the story here, so you know, it's looking at something that you can actually interact with. You're gonna remember so much more about it, because it's an experience, rather than just somebody telling you to learn something out of a textbook or a blackboard in a classroom. If history was taught with experience, you might learn better. [...] we're gonna go down and have a look at the model

now, and then we can have a look at it on *Minecraft* later, so I'm gonna try to get us to spot things in the model, and get [the children] to find them on *Minecraft* later.

As to how players engaged with the *Minecraft* map itself, from observations during the workshops, in which Adam Clarke introduced his work and the project, most adults let children take the controls and sat next to them, helping them navigate the city and making suggestions on what to do and where to go next (see Appendix C.4.2). Most players made their way to the cathedral, one of the most recognisable structures in Exeter, and discussed how it compared to the real-world structure. Many mentioned that, after leaving the workshop, they would go see the Hedgeland model in person for comparison. When asked what they would do once they downloaded the map at home, most guardians mentioned exploration of the environment as the main activity they expected their children to engage in.

When asked about experiencing the object in person and having the option of experiencing it within the game, interviewees mentioned they were keen on having both experiences, seeing the game map as a way to complement and improve the physical visit to the object, with none of the respondents reporting possible downsides to this improved experience in their view. One guardian summed up the advantages of having this kind of experience in a way that mirrors the case study's aim to give visitors improved access to the object through the game:

Guardian 19: [...] every time we come in, my son, he's quite interested in it anyway. So yeah, he always goes to [the Hedgeland model] and wants to look at it. [...] [the *Minecraft* map] is really good, because it obviously gives them a bit more of a hands-on thing. He's already interested in the models, and he can kind of go further and, you know, delve into the actual streets, which he obviously can't do in the model.

Another parent made a direct comparison between both experiences, concluding that having the object recreated in *Minecraft* had advantages compared to looking at the exhibited model:

Guardian 7: What I like about [the *Minecraft* map] is that it's better than the original model. When you're used to having to hold things up to your face and look, you know, like model cars or anything, and imagine you're in there, there's a lot to be said for that. What *Minecraft* does is it allows you to actually go into [it]. [...] It's like being inside a Lego model, rather than being inside reality.

These results suggest that the museum community, and in particular families with children, are keen on having the museum create *Minecraft* maps based on its collection, as a way to get children interested in going to visit the museum to see the objects in person, and curious to go home to the game and learn more about what they have seen.



Figure 3.4: Participants in the workshop explore the Hedgeland model of Exeter *Minecraft* map.

Clarke's choice of having YouTubers lead the activities during *Minecraft Day* is linked to their importance in videogame culture as creators of game-related content whose position is halfway between that of players and game developers, which in turn is close to the position that *Minecraft* players occupy in gaming culture, as the game encourages more creation and creativity than more traditional, non-sandbox games. As mentioned earlier in this chapter, one of the aims of this case study was to encourage members of the museum community to become not just game players, but also creators who contribute actively with game content related to the museum. Clarke, as Wizard Keen, hosted several workshops aimed at encouraging participants to engage with the Hedgeland map (Figure 3.4; see also Appendix C.4.1) and to create content around it, including videos, personalised avatars, coloured drawings, and physical sculptures in the pixelated style of the game through the use of fuse beads, small plastic beads

that fuse to each other when heated, mimicking the game's stylistic look in physical creations. Andy Robertson, as Geek Dad, led a workshop dedicated to family gaming, in which participants were shown how they can actively engage members of their family together in creative gameplay, regardless of age or skill. The younger YouTubers, Django and Solly, hosted a building competition that invited children create a virtual sculpture inside *Minecraft* inspired by a museum theme. Each player competed directly against other players, with five minutes to respond to a museum theme proposed by the audience. The building process was projected in real-time into the wall of museum's central courtyard, where the event was taking place, so that the activity directly involved the physical space of the museum, and had an audience comprised of other participants, their families, and other interested members of the museum community. This activity mixed the virtual space of the game with the physical space of the museum, as well as fostering connections between members of the museum community.

The building competition and workshops were the most popular activities during the *Minecraft Days*. According to interviewees, this was due to several factors. The first was the popularity of the YouTubers with *Minecraft* players. Many participants reported that their children, beyond just playing *Minecraft*, regularly watch YouTube videos and other online content surrounding the game. This reiterates the importance of tapping into the use of games and the culture around them to create a community of like-minded people who like to not just play, but also produce new content. This culture is particularly developed within the *Minecraft* community. Guardian 4, who had never been to RAMM prior to that day, and had decided to visit with their child because of the game, mentioned Adam Clarke when asked about whether they thought their child would be interested in playing with the Hedgeland model map:

Guardian 4: Yes, definitely. Especially because if it's something that [the child] can relate to, *Minecraft* is a really abstract thing, but it kind of makes it come alive if you can meet people like Adam, who's the YouTuber. (...) And then also recreate and create and interact with landmarks that are around you, I think that that's a really positive thing.

Another factor that contributed to the popularity of the day's activities was the possibility of getting hands-on with the game, which was especially visible during the building competition. The popularity of the competition, even with visitors who were not competing, is related to the previously mentioned culture of watching

others play games. Several families, whose younger members had not arrived in time to participate as builders, joined in the competition as members of the audience, watching other players building inside the game, suggesting themes and helping to choose the winners:

Guardian 11: They weren't even involved in [the building competition], they were just watching, and I asked "Do you want to leave? Are you bored?" And they were like, no, and just staring at the screen. So because I think that they're just so into just watching it, because it's *Minecraft*, they'll take anything.

The connection between the virtual building process within *Minecraft* and the more traditional activity of using Lego bricks to create structures was explored in a drop-in activity held in the vicinity of the Hedgeland model exhibit. Here, participants could engage in activities using Lego bricks, either by themselves or in a group. This activity, together with the ones mentioned in the Wizard Keen workshop, encouraged the creation of physical artefacts inspired by the game. Elsewhere in the museum, another drop-in activity allowed members of the community to be photographed in front of a green screen, which was subsequently replaced with screenshots from the Hedgeland model *Minecraft* map, effectively placing them inside the map. This, together with the building competition, encouraged players to step from the physical environment of the museum into the digital world of the game.

The second *Minecraft Day* was dedicated to the first of two maps that depict two different versions of the city of Exeter during Roman times. As mentioned before, these maps differ from the Hedgeland model one as they are not remediations – reproductions in a different medium - of a collection object. Instead, they are game worlds inspired by resources and objects in the museum's Roman collection. Nevertheless, the activities during the event were similar to the ones of the first *Minecraft Day*, with the addition of popular YouTuber Tomohawk1989, who joined the rest of the team in leading workshops for the community, and the inclusion of handling sessions of Roman artefacts within the museum galleries, creating a bridge between the digital and physical objects (see Appendix C.4.4).

During the events, we encouraged the community to also engage online, beyond the participation and content creation that occurred in the galleries. To this end, the museum created a dedicated website where player's creations can be uploaded. However, contrary to expectations, the museum has not received

contributions from players outside of what was created during the *Minecraft Days*. Players engaged much more with the game worlds and the objects when visiting the museum physically, rather than just downloading the maps and visiting them in their homes. This suggests that players do not feel as motivated to create and share content when they are physically separated from the museum and its collection. When accessing the map and engaging in gameful activities within the hybrid space created by the digital game environments with the physical space of the museum, they become players and content creators, which was one of the primary aims of this project. It is possible that, away from the museum space, players feel less motivated to engage with the digital content provided by the museum, and to create their own related content. This underscores the importance of locating gameplay activities within the museum, rather than remotely. Another factor that contributes to this increased engagement when combining digital game content with physical assets is the potential for community building. By giving players the opportunity to meet outside the game, in real life, away from the screen, in a safe environment that is conducive to learning, the museum becomes a hub for the community to meet, for the children to play and create together, and for the parents to talk to other parents and get involved in the gameplay with their children.

Earlier in this chapter, while studying previous experiences with *Minecraft* in museums, I assessed that most maps do not take full advantage of the features and possible benefits of *Minecraft* and its surrounding participatory culture. While an effort was made to address this shortcoming in the RAMM case study, it would be inaccurate to say that RAMM's Hedgeland model map achieved that goal, as some of the features the team would have liked to include, such as online multiplayer servers, were not possible due to limited resources. However, from the museum's point of view, the project succeeded in its primary aim, which was to create an experience that connected visitors, the collection object, and the museum space, and which encouraged more people to visit the museum. Results suggest that using *Minecraft* as an engagement tool is successful in bringing new visitors to the museum, in increasing awareness of the model, and improving the ways that visitors can access and experience the object. By turning visitors into players, and players into content producers, the museum also improves its position as a participatory platform where the community can go to collaborate,

contribute with ideas, share their creations, and meet each other in real life. More than a learning instrument, the game becomes a tool for encouraging visitors' curiosity and creativity, providing a fruitful environment for engagement and the possibility of learning.

Some parents mentioned that having games in the safe space of the museum, as part of activities that they can identify as being beneficial to the children in terms of learning and engagement, helps demystify preconceptions surrounding videogames and validate them as culture objects. However, one parent mentioned the fact that museums should not just use any game to create engagement, but should instead focus on games that have a clear connection to the exhibits and to learning:

Guardian 24: *Minecraft* obviously has the kind of... You can link it to Exeter and the Romans has ties with history and learning, and I think that's brilliant, but if you had Sonic the Hedgehog running around, I'm not sure that... I'd need to see what, to understand what the educational purpose of it was, or why it was adding value to the museum experience, rather than just having them as kids, I think, gravitate to it, and not actually look at the physical exhibits.

This idea of learning in a game environment is related, as mentioned before, to the concept of stealth learning. During gameplay, children naturally engaged with information regarding the exhibits and objects included within the game. The inclusion of goals and a structured way of exploring the maps, by giving players initial guidance on what to do inside the maps, contributed to this. This structured guidance gives them motivation to keep exploring the map and learning more in the process. Guardians also mentioned the benefit of being able to link potential maps with the more formal curricula of schools:

Guardian 29: [...] with the kids being the sponges that they are, they can go on a game and find out about history. I think that's invaluable. I mean, they learn at school, but in their own environment at home, to learn the same, brilliant. Absolutely brilliant. [...] you can come to the museum to see the Tudors, or the Romans, and they can say, "yeah, we've seen that on *Minecraft*". You know, like *Minecraft* is a teaching tool, invaluable. It makes learning fun.

Several guardians also mentioned the educational benefits of *Minecraft* regarding digital literacy in general, and gaming literacy in particular. Many guardians have started to consider games as a useful tool for getting their children interested in learning:

Guardian 28: I feel that gaming is the way forward, because we've got an older son who, you know, that's, you know, the motivation to go online and understand things, and to create things, is something that... His skills are so transferrable to other things. And things like, I was talking to a friend of mine and saying about the motivation to read. If you are a reluctant reader, and you give the child a purpose, then things like this, you have to read the instructions, and you have to think through things. So I think it's, you know, you start a project, and then you finish it, so for me, if museums are about learning and understanding things, then this adds to it. So I think it's a great combination.

The workshops organised for *Minecraft Day* had benefits regarding these aspects, as they not only encouraged players to create content, they also gave children and their families the opportunity to interact directly with professionals who make their living out of the game, either by creating experiences with them or by creating videos and other digital content based on the game. Of more importance to visitors' engagement and meaning-making within the museum was the fact that players were asked to create content inspired by the game and the museum objects. This encouraged them to engage more deeply with the objects included, to look at them with a renewed perspective, and to create their own interpretation of them, both inside the game during the build battles, and outside the game in the workshops.

Last but not least, the use of *Minecraft* to create gameful experiences based on objects contributed to building bridges between the digital and physical objects and spaces of the museum. These bridges create a complex web of experiences that weave from digital into physical and back again. As mentioned before, this encourages people to engage with the physical content of the museum and to keep coming back to visit. Augmenting objects in this gameful way also allows museums to breathe new life into permanent exhibits and objects that people are already familiar with, as well as drawing attention to them from visitors who did not have previous knowledge of those objects and may not have visited the museum had it not been for the presence of *Minecraft* and associated events.

Conclusion

This chapter was dedicated to the transformation of an object in a museum's collection into a game world, which can be explored and played in alongside the experience of the original object. This follows an existing pattern of museums using digital technologies to augment the information and engagement space

surrounding objects, with the addition of game technologies and the interactions possible within a game world. I started the chapter with an introduction to the strategies that museums have previously employed to enhance collection objects through the use of digital media. What these strategies have in common is that they expand the virtual space associated with a given object, allowing visitors to access more information about that object, and they also make that space participatory by inviting people to contribute their comments and other content regarding the object. The use of game worlds can be considered an evolution of these earlier forms of digital engagement, with the added advantage of encouraging gameful types of interaction. This has the potential to tap into players' motivation to visit and play, which in turn has benefits in terms of engagement and learning.

Within the broader context of this investigation, this chapter was dedicated to collection objects, specifically those that are on display in the museum's permanent exhibition galleries, as one of the components of the museum experience that can be structurally transformed through the use of location-based design. The case study in this chapter augments a collection object, *Caleb Hedgeland's model of Exeter in 1769* by transforming it into a playable landscape, and creating location-based gameful activities within that world. The aim was to transform the object into a game world, with the associated game elements and interactions, and populate it with the knowledge surrounding that object, communicating it to visitors in ways that would not be possible by relying on the physical exhibition or on other digital technologies. In this environment, information is present in ways that make sense for the game world, that is, as part of the playable environment. The map also allows visitors to have access to the object in ways that would not be possible otherwise. Throughout this case study, observation of players' behaviours and interview data confirmed that location-based game design is beneficial as a way to create bridges between the museum's digital and physical spaces. The game world and the experiences created with it made use of digital resources and drew attention to the objects on display.

Finally, this case study was the only one in this investigation designed to be targeted at families with children. Results suggest the main interest of families is to use games as a way to attract children to the physical space of the museum,

to encourage their curiosity about the collection, and to improve the ways they can experience the museum's content. The lack of engagement with the map online, as opposed to the popularity of the activities promoted around it within the museum space, contribute to the conclusion that in-gallery location-based gameplay, instead of staying exclusively in the digital domain, is an advantageous choice for museums to become gameful.

By structuring the museum visit into an event grounded in the exploration of a game world inspired by objects in the collection, players become aware of the existence of those objects and express interest in learning more about them, usually as part of the visit itself, which becomes a blend of in-game and in-gallery exploration and playful engagement. An additional finding resulting from this chapter is the interest that the broader gaming culture, comprising, beyond the games themselves, famous players and creators of content such as *Let's Play* videos, can have for visitors who are primarily game players. The adoption of a full-fledged, commercial videogame as a tool for experience and interpretation in museums is a complex process, with the need to involve a team of outside collaborators. This builds up on the work I developed in the previous chapter in terms of complexity of the game design and the resulting experience, but results in additional financial and human resources expenditures that may not be feasible for all museums. On the other hand, it brought bigger benefits in terms of the amount of people reached and the engagement that followed. While still in its early stages, the use of *Minecraft* for engagement and interpretation can be considered a safe bet for museums. The game's popularity shows no signs of abating, and its developers continue to invest in its educational potential. Therefore, cultural institutions should continue to experiment with this format in order to encourage new visitors to the museum, and to improve the ways that existing visitors can experience the collection. Now that the initial steps have been taken, it is possible for museums and *Minecraft* creators to collaborate in more experimental projects which take full advantage of the game's features and possibilities.

Chapter Four: Environmental Puzzles and the Museum Space

This chapter is dedicated to the study and development of location-based game design strategies that incorporate a museum's space, which comprise the building, the galleries and the exhibitions therein, as a major part of their design and gameplay, and determining the resulting effects on visitors' motivation and engagement. The focus here is on using environmental storytelling, puzzle-solving and other game elements and mechanics to encourage players to engage with the physical space of the museum and the objects displayed. Within this investigation, this chapter comes last, both chronologically and conceptually, as it brings together lessons from previous case studies. While focused on the transformation of the museum galleries into a game board, the strategies developed here represent how the three components of the museum experience initially identified as possibilities for becoming gameful, that is, the tour, the objects, and the space, can be made gameful and combined into the creation of different types of location-based gameplay.

From Victorian-era buildings, to repurposed industrial constructions, to post-modern white cube architectural creations, the building that houses a museum is connected to that museum's identity, and so incorporating it into the design of a game makes it location-based, encouraging players to visit and explore the physical space of a specific museum. Using the environment to tell stories and to create puzzles and challenges for players to solve has an impact on the way that players engage with the space and exhibits. Players are encouraged to physically visit the museum in order to play, and during gameplay, to pay more attention to their surroundings, to explore the museum's architecture and galleries, and engage with the objects exhibited, to visit parts of the galleries they may otherwise not have visited, and through the use of storytelling, to think of themselves as part of a bigger narrative that is embedded into the museum, encompassing its architecture, collection objects, and history.

The transformation of the museum space into a game board through the use of environmental storytelling and puzzle-solving, among other game elements and mechanics, can take multiple forms, including live action role-playing games, alternate reality games, escape rooms, and other types of location-based games. These forms share similarities to those that were analysed in chapter two, dedicated to the museum tour, in which visitors are taken on a gameful journey

through space, and have to complete tasks to advance in the game. However, the experiences in this chapter differ in the sense that they are more focused on transforming the physical environment of the museum into a game board, through the use of the environment as a storytelling device and as part of puzzles and challenges, rather than on transforming the museum tour and the path taken by visitors. In other words, whereas chapter two focused on transforming the visitor experience into an action-driven quest or journey, this chapter focuses on transforming the museum's physical environment into a context for gameplay involving storytelling and puzzles.

In this chapter, I start by investigating the gameful potential of a museum's physical space and the game design strategies that can be used to incorporate it into location-based games. I examine how the physical space of museums contributes to their identity and helps tell the story of their collections and exhibitions, through the use of the architectural characteristics of a museum's building and the creation of evocative environments. I identify the game elements, mechanics and design elements that fit those existing structures, including storytelling through the environment, giving players a role to play within that story, and solving puzzles and challenges based on the space. As a player-researcher, I then study a selection of gameful experiences previously developed for museums that incorporate the museum space into their gameplay, in order to assess how they change the visitor experience and to identify lessons and gaps in knowledge to be addressed by the present investigation. Finally, I help design and analyse a location-based game that incorporates RAMM's galleries, exhibits and objects into a game inspired by escape rooms, created in partnership with a local company, and investigate the impact it has on people's motivation to visit and engagement when visiting the museum.

Incorporating the Museum Space into Puzzles

This section is dedicated to determining the potential of incorporating a museum's physical space into the design of location-based games, and the game elements, mechanics and strategies that can be used in that process. By recognising parallels between museum spaces and game spaces, it is possible to recognise possibilities for the application of game elements to this part of the museum experience. To that end, I examine the museum space as a medium that integrates and communicates messages and information not only by its contents,

but also by its structure and in-built characteristics, helping to tell the museum's stories through the building, the galleries, the exhibits, and the objects on view, and identify the game design strategies that can be used to enhance that story. Later in this chapter, I indicate how these ideas will be applied during this investigation, in the design of the case study at RAMM.

All environments embody and communicate messages, whether deliberately or accidentally. Spaces are naturally embedded with objects and stories to which meaning can be ascribed (H. Davies, 2007). These messages can be about the function of that space - for example, a space which includes a stove, an oven, a microwave and a sink can be interpreted by someone with certain cultural knowledge to be a kitchen, where food can be prepared - as well as expressions of symbolic meaning - the kitchen surfaces may be covered in dishes alluding to a birthday celebration, which tells us something about the people using it. Hence, we can think of a space or environment as the combination of architecture, design and the contents of that space, a built medium that transmits a message or narrative about itself.³⁴ In the case of museums, the use of physical space to communicate ideas and stories, about the collections and the institutions themselves, is done through the building's architecture, through exhibition design, and through the objects displayed. The architectural characteristics of museums tend to be more permanent, while exhibition design encompasses temporary or quasi-permanent interventions upon the gallery space, in terms of lighting, the choice of colours and materials, the organisation of the space, what types of information are included and how they are presented, and the ways objects are displayed. While a detailed analysis of the literature in this topic goes beyond the scope of this study, an important point for the purposes of this investigation is that when it comes to analysing museum space, the architecture, exhibition design, and content, in the form of object displays and the information that accompanies them, can be identified as the three major components that make up the museum space.³⁵ This combination is what I refer to when using the expression museum space throughout this chapter.

³⁴ The idea that 'the medium is the message' – that is, that technologies and means of communication embody messages beyond their content, through their nature and characteristics - was first formulated by Marshall McLuhan (McLuhan, 2005 [1964]).

³⁵ The various facets of physical and spatial characteristics of museums have been studied by authors from different disciplines. Examples of this include the study of museum space from the perspective of design thinking, and how that thinking can contribute to visitor-centred missions

The Museum Space

When it comes to architecture, museum buildings have, from the beginning, contributed to conveying messages to the public through their physical characteristics. Whether purpose-built or repurposed spaces, museum buildings are often made to be distinct from their surroundings, becoming an important part of the institution's visual and conceptual identity. Architecture is an integral part of the narratives museums create about themselves and their missions, creating expectations and starting to tell the institution's story even before visitors step inside. When discussing the social meanings and implications of the physical spaces that house museums, Falk and Dierking highlight the fact that the idea behind museum architecture is 'to make a statement to the world' (J. H. Falk and Dierking, 2012, p. 180). This can be a deliberate message about the institution's aims and mission, or implicitly derived from its origins and history, and can take the form of high-tech inspired science centres, to contemporary art museums housed in cutting-edge architectural creations, to abandoned industrial spaces which have been redeveloped into cultural spaces, to museums with historical origins in the eighteenth or nineteenth centuries, among other possibilities. Many buildings eventually become insufficient to house their collections, which grow steadily over the years, leading institutions to refurbish and expand the space with modern additions. Examples of these developments include the British Museum and its Queen Elizabeth II Great Court, and the Victoria and Albert Museum's Exhibition Road Quarter, Sackler Courtyard and Sainsbury Gallery. The resulting hybrid buildings tell a story of the meeting between old and new, past, present and future, reflecting their institutions' historical origins and future-facing missions.

As is the case with museum architecture, exhibition design has been the topic of considerable scholarship.³⁶ Exhibition design refers to the creation of the gallery

(MacLeod, Dodd, and Duncan, 2015), from the viewpoint of how space and architecture can be incorporated into storytelling within contemporary exhibition-making (MacLeod, Hanks, and Hale, 2012), how different architectural forms and exhibition characteristics influence the interpretive strategies used by visitors in the process of making meaning (Achiam, May, and Marandino, 2014; Mortensen, 2010; Schorch, 2013), how museum design can influence the sociocultural interactions therein (Rahimi, 2014), and from the viewpoint of the museum space as a core component of the larger museum experience (J. H. Falk and Dierking, 2012). These examples illustrate the variety of perspectives from which the topic can be approached.

³⁶ Tony Bennett wrote a historical overview of how the display techniques and the use of physical space in museums have been influenced by different outside institutions, such as world fairs and amusement parks, which in turn have adopted techniques borrowed from museums, in

space interiors, including permanent and temporary exhibition spaces, in order to improve logistical conditions and to better convey the theme and content of the exhibitions. These include decisions regarding the lighting, colours, materials, how much space is allocated to objects, information, and visitors, the directions visitors have to help them navigate the space, the types of interpretation materials included and how it is conveyed to visitors, and the ways objects are displayed, among other considerations. As explored in the previous chapter, the objects exhibited, by themselves, are evocative, tell stories, and often provoke thoughts and feelings (Turkle, 2007), but this evocative power is influenced by their surroundings, as it is different to encounter an object in the context of a post-modern gallery, as opposed to in a 19th century gallery in which old museological exhibition strategies are in place. Curators work with architects and interior designers to create multimodal spaces composed of architectural elements, signage, and digital media, integrating these with the objects themselves, which work synergistically to communicate ideas or a story. The forms of the resulting exhibitions can vary from highly immersive spaces which attempt to transport visitors into other worlds,³⁷ to exhibition spaces whose interior architecture reflects the concepts exhibited,³⁸ to natural history dioramas, to highly interactive exhibits, to white cube galleries which attempt to create a neutral context for objects, to combinations of these and other display techniques, which in turn

a web of influences referred to as an 'exhibitionary complex' by the author (Bennett, 1995). A more recent anthology on the topic of exhibition experiments, with contributions from several authors charting the use of different exhibitionary and remediation forms around the world, has been edited by Sharon Macdonald and Paul Basu (S. Macdonald and Basu, 2007). Other recent examples of relevance to this investigation include the aforementioned research-led study of the value of design thinking for museums, specifically conducted at the Imperial War Museum North, but drawing conclusions which can be applied to other institutions, including the importance of curating as the creation of structures for experiences, rather than vessels for objects (MacLeod et al., 2015). Achiam, May and Marandino have studied how, in science exhibitions, the notions of affordances and distributed cognition can be used to understand and develop the meaning-making interactions between visitors and educational mechanisms (Achiam et al., 2014). The concept of affordances was initially formulated by Gibson (Gibson, 1989) and applied to the world of design by Norman (Norman, 1988), and it denotes the properties of objects and places which suggest particular frames of reference to people, while distributed cognition (Zhang and Patel, 2006) explains how meaning making is an activity that is both internal (occurring in the mind) and external (embedded in the physical space). This study highlights the fact that different interpretive strategies and exhibition designs appeal to different types of visitors, and the interaction between external and internal frames of reference results in different interpretations (Achiam et al., 2014).

³⁷ A recent example is the exhibition *Adventures in Moominland* (2017) at the Southbank Centre in London, which took visitors on a journey through caves, forests and other interactive environments inspired by the exhibition's topic.

³⁸ An example is the Science Museum of London's Mathematics: The Winton Gallery, designed by Zaha Hadid architects, who drew inspiration from the mathematical equations of airflow.

influence the interpretation and experiences of visitors. Moreover, examples of all of these can often be found inside the same museum.

Finally, the last component of the museum space as identified in this investigation is the content exhibited, in the form of objects and the ways they are displayed. With the exception of institutions such as science centres, where the focus is less on objects and more on creating physical manifestations of concepts, in most museums, this content takes the form of collection objects, often in permanent exhibits, which can be supplemented with objects on loan from other institutions for the purpose of temporary exhibitions, and information about those objects in the form of written labels, digital displays, gallery texts, and other supporting materials. The nature and characteristics of these objects is unique to each museum and to the focus of its collection, which means that incorporating them into narratives and experiences is a form of making those experiences location-based. As a whole, the collection of objects to be found in a museum, the objects that are selected to go on exhibition, the ways that those objects are exhibited, and the information that curators choose to highlight about them, are strategies that help to tell the narrative about that museum. According to the narrative they want to tell, museums can choose to include in their permanent exhibits objects that are particularly rare, historically significant, curious, or popular, and they can draw on a range of display techniques to engage the attention of visitors and highlight information about the objects.

Narrative is often used as a structure for communication and meaning-making in museums, uniting architecture, exhibition design, and the displayed objects for the purposes of multimodal storytelling, that is, a type of storytelling that uses textual, aural, visual and spatial resources, among others. Nielsen has defined the term 'story' in the context of museums as 'a narrative that creates engagement' (Nielsen, 2017, p. 445).³⁹ As we have seen in this section,

³⁹ It is useful to mention here the difference between narrative, story and storytelling. I use the word narrative to refer to the timeline of events and the order in which they happen in a particular story. Story is a term which refers to the overarching structure, the characters, the time in which the events are set, the story world. Storytelling describes the way that the events are told. Therefore, the same overarching story can have different narratives, that is, the same events can be told in different ways: stories may be linear or nonlinear, told in one medium or across different media, seen from different points of view, narrated by different characters, with different tones which can range from the comedic to the dramatic, according to different pacing, and so on. Storytelling becomes the act of communicating the story and the strategies employed to do it.

museums already incorporate narratives about their own history and the history of the objects in the collection, as well as their context, significance, care and interpretation, in their buildings, exhibitions, and interpretive interventions within museum space, creating what can be called 'narrative environments: experiences which integrate objects and space – and stories of people and places – as part of a process of storytelling that speaks of the experience of the everyday and our sense of self, as well as the special and unique' (Hanks, Hale, and MacLeod, 2012, p. xix; see also Kossmann-dejong, 2010). The question becomes, in what way are stories relevant to museums, and why is it important to think of the museum space as conducive to multimodal storytelling? The main reason behind this is that stories represent one of the most important ways that human beings structure and make sense of the world:

'Our perception of ourselves and the world around us is structured around stories, then, and this influence of narrative extends into the museum as a common language for diverse professionals involved in exhibition making; as a means of creating empathetic links between the subjects and audiences of museum displays; and as a glue which plugs temporal, geographical and cultural gaps within the museum.' (Hanks et al., 2012, p. xxii)

What this means is that, consciously or unconsciously, people make sense of their experiences by organising meaning and events into stories. As such, the use of stories in museums can bring many benefits. Stories can give a more diverse and subjective set of perspectives about a museum's collections, incorporating different voices and viewpoints, rather than relying on a single, authoritative and often impersonal voice. They can assist museums in becoming more accessible, pluralistic, democratised, and reflective of the diversity of its communities (Simon, 2010). As places in which often disparate objects and information are assembled into collections and exhibitions that visitors need to make sense of, museums can use stories as 'a way to organize and comprehend events that may stretch far beyond the limit of our lives or experience, and also provide an affective human-scale introduction to those events' (Fraser and Coulson, 2012, p. 224). Stories can also tap into visitors' curiosity and motivate them to keep interacting with the museum content in order to discover what happens next. They can help visitors identify more easily with the museums and the content exhibited, by giving them a human and emotional context in addition

to the facts and information conveyed by institutions, and putting them inside that story, so that they become part of the narrative.

The use of the word story does not necessarily imply fiction. However, even in places such as museums, which are dedicated to facts, or at least to the most accurate versions of history and information that they can achieve, there is a place for fiction and imagination. The caveat is that fictional stories that employ imagination and make-believe must be grounded in the historical and factual accuracy of information associated with museums. As explained in chapter one of this thesis, people do not go to museums expecting an experience of pure entertainment; instead, museums are part of an informal learning ecosystem in which visitors expect to have the opportunity to learn something, as well as be entertained. As such, the stories museums tell need to be based on the knowledge they have available, which means building them around the information and resources available, and using the space and the objects exhibited therein as props and narrative devices for these transformative and learning experiences (Henning, 2006, p. 112). Storytelling draws upon imagination, but for museums, this does not mean going against facts or being scientifically or historically inaccurate. Instead, it means that, just as they do when designing exhibitions and spaces, museums must make sure that any kind of interpretative materials they create for visitors respect existing boundaries, while not overpowering communication strategies with pure facts, a strategy that is especially important when creating games with an educational aim, which often cease to be fun and entertaining if they are too focused on facts and not enough on being enjoyable. Artistic license can be employed as long as the result is relevant for the experience, does not contradict facts, and stays true to the museum's aims.

The Space and Game Design

Parallels between the museum space and game elements, mechanics and related game design strategies can be found in how the space is used for storytelling. When developing narratives for museums, the techniques used are closer to those found in theatre and theme parks, rather than in literature, film or other traditional storytelling media. Narratives are multimodal, as the museum is a three-dimensional space in which objects are necessarily experienced in an immersive, temporal and spatial way (Hanks et al., 2012, p. xxi). Narrative

becomes non-linear, as the visitor is free to explore many different routes and threads, building a personal perspective from the combination of narrative fragments with their pre-existing views and experiences (Kossmann-dejong, 2010, p. 69). By using techniques such as immersion and interactivity, museums engage in what can be called environmental storytelling, that is, using the built environment to incorporate clues and messages relevant to a story, leaving the visitors' imaginations to fill in the blanks (Ensslin, 2015, p. 44).

Environmental storytelling as a term applied to describing a narrative device is more often used in the context of videogames (Jenkins, 2007, p. 57), but can also be used to describe places such as theme parks, shops, churches or museums. It requires thinking of the museum space as theatrical, both part of the story and the stage where that story occurs. As I have shown in this section, this theatricality can manifest in the form of environments built out of objects, illusions, physical and digital scenography, in combination with more traditional museological devices (Crawley, 2012, p. 14). Graham Black, based on the work of Jackson and Kidd (Black, 2012, p. 158), describes some of the advantages of thinking of the museum as theatre in engaging audiences with collections. According to him, theatrical stories are a way of linking contemporary visitors with the past, particularly when drawing on real life events and characters: roleplaying and performance gives visitors the opportunity to create a more personal and immediate connection with history, by being inside the action as a performer, rather than as an outside observer (ibid). Unlike in theatre, which relies solely on fabricated stage props, in museums this authenticity is reinforced through the use of historical artefacts as part of the performance. Collection objects can be used to create ambiance or as integral parts of the story. Through immersion in these spaces and narratives, visitors become a part of the museum's narrative.

A parallel can be made between building a narrative in museums and in games, where it is more effectively done through environmental storytelling, that is, using cues and symbols in the game world and level design, as opposed to relying on text, dialogue or exposition (Jenkins, 2007). While not necessarily present in every videogame, stories are a major component in certain genres, and games have emerged as an important storytelling medium in recent years, its form considered as relevant for contemporary times as film was for the twentieth century (E. Zimmerman, 2014). Stories in games may be told through text,

dialogue between characters, cut scenes, and other strategies for exposition. However, using the environment to immerse players in the story is something that games can do, as unlike other storytelling media, they incorporate a space that can be explored. As in immersive theatre, players become immersed in the narrative by being physically immersed in the setting (Biggin, 2017, p. 117). Spatial stories can immerse players in the narrative through several ways, namely by evoking pre-existing associations within the narrative, by providing a staging ground where events happen, by embedding information into the setting, and by encouraging emergent developments within the narrative (Jenkins, 2007, p. 57). Environmental storytelling often results in experiences the resolution of which depends on players moving through the space and reaching a destination, which in museums can be used to guide and structure their journey.

After looking at the importance of stories and storytelling for museums, it makes sense for them to be an essential part of location-based games, and for game design to become a significant tool for storytelling in museums. Location-based games have started to be used in museums as digital storytelling tools, balancing educational purposes with engagement and entertainment (Rubino, Barberis, Xhembulla, and Malnati, 2015). When it comes to location-based game design in museums, in order to make use of the value of storytelling for museums combined with the value of creating location-based experiences, I suggest that the best strategy is to develop stories as specific as possible to the museum they are set in. This means that, instead of, for example, creating a generic story set in Roman times that puts players into the role of a Roman, using collection objects as props within the game, it is better to look at specific objects in the museum related to Roman times, and let those objects, their characteristics, history, background and idiosyncrasies dictate the kind of story that will be told. This results in games that cannot be played anywhere else, and which directly engage players with the unique characteristics of each museum's space and collection objects.

A game mechanic that is related to storytelling is roleplaying. In a game, roleplaying occurs when players are given a role as a character that is part of the story being told, and which they can incorporate in order to interact with the game world. Roleplay in games can take different forms. Players may create their own character within parameters set by the game system, such as gender, race, profession, skills, and background, in which case, they are free to adapt their

character to the game as they see fit. Alternatively, they may be given a specific character to play that already exists within the story, which means that this character then becomes a hybrid between their characteristics, history and personality, and those of players. It may be that the role given to players is simply a generic description used to give them a place within a story, such as the role of an investigator in a mystery, or an explorer in an adventure. This can be related to the inclusion of cooperative or competitive elements within the game, according to if players are working towards the same goal within the story, and working together or separately. In all cases, giving players a role to play helps them feel like they are a part of the story being told. By positioning players within the story in a first-person perspective, game designers can create a sense ownership of the narrative and the game world, as well as a feeling of agency, that is, of being able to influence the outcome of what happens. By making players more emotionally and intellectually invested, the gameplay and stories becomes more memorable, as they become part of the personal histories of players.

An important game mechanic that can be used to incorporate the museum space into games is exploration. Exploration, in games, plays with the natural curiosity of players in wanting to find out what is hidden from them within the game world. It is a major part of open-world games, for example, but also of resource management or survival games, in which parts of the game world are hidden by the use of 'fog of war', a strategy which game designers use to create uncertainty and encourage exploration (LeBlanc, 2006). Environmental storytelling is conducive to exploration, as navigating the space becomes part of the story. In museums, designing for this mechanic means that we encourage players to navigate the museum space, in guided or unstructured ways, discovering new spaces or looking at familiar ones in a different way. In practice, this means encouraging players by taking certain paths that consider the configuration of the galleries, the footfall and crowdedness of certain spaces, and the signposting in the galleries, without restricting the players' movements excessively. The gameplay may encourage players to explore less visited areas of the museum, and to stay away from the most popular ones. This requires game designers to consider how players find their way while navigating the space, requiring the use of signposting. In museums, designers can make use of gallery designations,

specific details in the space that serve as landmarks, and they can give players a map of the space, or encourage them to ask people for directions.

Last but not least, the museum space can be incorporated into game design through incorporating that space into challenges, and in particular, puzzles. Puzzles are intellectual challenges that players have to solve, which create engagement by appealing to their curiosity (Fellows, 2011). They can take many forms, from mathematical, logical, language-based, requiring players to find objects or information, among others, depending on the type of game. In the case of museums, puzzles can be designed so that players need to use the information they find through exploration of the museum space and examining the objects in order to find the solution. While not all puzzles in location-based games require the use of facts and information found in the museum, when used in this way, this game mechanic is relevant to create engagement. If game designers create puzzles that require the physical exploration of the museum space, as well as an analysis of the objects on display, players are encouraged to examine objects and learn information as a by-product of gameplay, as the goal becomes doing what is necessary to solve the puzzles. This type of learning, often found in games, is called stealth learning (MacCallum-Stewart, 2011). I propose that the most effective way of implementing this during game design is to create puzzles and challenges that not only require skills and intellectual engagement from players, but that are based on clues and objects that are present in the space of the museum, with an emphasis on objects in the exhibitions.

In this section, I examined the museum space in order to determine the structural characteristics that can be incorporated into the game space. I have shown the importance of stories, specifically environmental storytelling, as a means of immersing visitors in the content that museums have to offer. By making that story into a game, we may encourage roleplaying from players, which may facilitate identification with and relatedness to the content of the museum. Game designers can also create challenges and puzzles that make use of the museum space, and encourage players to explore that space as part of gameplay. The game elements listed in this section are the ones I identify as the most relevant for incorporating the museum space into the game design process. The following section is dedicated to the study of past experiences, as well as my perspective of player-researcher of existing museum games that explore one or several of

these applications, and the section next to that is the analysis of the case study developed for this chapter in the context of RAMM. The game elements listed in this section serve as guidelines for the analysis to be carried out within the rest of the chapter, both in terms of how those elements are implemented in game design in museums, and regarding the effects they have on the visitors who play the resulting experiences.

Key Examples: *Art Heist* (2010) by Coney, *Mystery in Frankenstein's Lab* (2018) by Atomic Force Productions, *Capture the Museum* (2013) by Thought Den and Splash & Ripple

In this section, I analyse a selection of location-based games that incorporate the museum space through the use of the game elements and mechanics mentioned in the previous section, in order to map the field, learn about the design of those games, and discover the effect they had on the visitor experience. The choice of games included follows the criteria established in the thesis, which is to focus on experiences created for public museums in the United Kingdom, and within that scope, to select games which reflect a variety of perspectives and applications of the game design strategies considered. The examples analysed here draw inspiration from digital games, immersive theatre, and escape rooms, resulting in experiences that can be categorised as immersive gameful performances or theatre, alternate reality games, cooperative or competitive puzzle-solving games, and escape rooms.⁴⁰

Immersive gameful performances or theatre, which I introduced in chapter one, place participants into an evocative environment, putting them at the centre of the events, and sometimes giving participants tasks or implicating their actions in how events unfold. Experiences categorised as immersive theatre can be described as theatrical performances 'which use installations and expansive environments, which have mobile audiences, and which invite audience participation' (White, 2012). These experiences rely on environmental storytelling as a way to immerse participants into the worlds they create. While an analysis of the history of immersive theatre, and the relationship of those experiences with

⁴⁰ Live-action roleplaying games, while relevant for this part of the investigation, proved difficult to find in museums in the United Kingdom, and their design, similar to the conclusion regarding alternate reality games, and which I go into later in this section, too resource intensive for me to be able to carry out effectively within the limited time and resources of this investigation.

games, goes beyond the scope of this investigation, it is possible to see points of contact between both, particularly when it comes to environmental storytelling and the agency given to participants, who become an integral and active part of the world. The relationship between immersive theatre and space is analogous to that between location-based games and space, in that these found real-world places 'provide ready-made exploratory landscapes, redolent of other histories, into which performances can be scattered, and in which engagement with the environment can be an important part of the audience experience' (White, 2012). The similarities can be seen to account for the gameful characteristics of these productions and the subsequent difficulty in categorising them as theatre or as games. Gameful immersive theatre productions have been created for a variety of spaces, including museums. In the United Kingdom, an example of an interactive and immersive theatre company who have developed work for cultural institutions is Coney.

Interactive theatre company Coney create experiences that can be more clearly defined as games than other immersive theatre experiences, as they are more structured and guided, but also more open to audience agency, since players can influence the way the stories play out. A recent example of their work outside museums, *The Drones* (Coney, 2016 - 2018) is an immersive theatre production with escape room elements, created in collaboration with children between the ages of 6 and 11. Set in the basement of a former carpet factory near London Bridge, in *The Drones*, adult participants were led throughout a maze-like space by the young performers, attempting to solve puzzles and riddles while immersed in a surreal environment. Instructions and rules were given by the children in character, at times deliberately taking advantage of the adults' confusion and hesitation (Bano, 2018). The experience was location-based in that it used environmental storytelling, and also because it incorporated the site's history as a carpet factory into the science-fiction story that was told through the built environment. Player agency was limited, and exploration was guided by the performers, but there were elements of storytelling, immersion, performance, rules and puzzle-solving present.

When it comes to experiences set in cultural institutions, in this case, the New Art Gallery Walsall, Coney created *Art Heist* (Coney, 2010) an immersive gameful performance that can be described as an alternate reality game, in which the

outcome of the narrative is shaped by the players' choices and actions, and the story is conveyed through various media of communication, before, during and after the game. The experience started one week before players go to the gallery, when they received emails from the characters, namely, a wealthy collector who is determined to keep and conserve an artwork by a famous artist who destroys all of her pieces after they have been exhibited. The collector plans to do this by enlisting the help of players in creating a forgery and swapping it with the original (Mees, 2011, p. 88). This pre-event phase, which also included links to the fictional artist's blog, is what brings the experience closer to an alternate reality game, and was intended to increase anticipation and set the context for the story. As to the experience in the gallery, once players arrived, they interacted with the collector to gather information about the gallery and its security, plan the heist, devise strategies to deal with security guards, create a forgery, break into the gallery, and then decide, as teams, how the game ends. The dilemma was, should they respect the artist's wishes in her art being destroyed? Should they instead give it to the scheming collector for safekeeping? Or should they try to convince the gallery's curators to preserve the work for future generations? Negotiating the answers engaged players with the gallery's mission, its reason for existing, the nature of art, and the role of artists, collectors and curators, in the process implicating themselves, the players, into the art world. The aim was to engage players with ideas around the value and ownership of art, including who it is for, what the place of galleries and museums is in people's lives, and if value can be found primarily in ideas or objects (ibid).

Players had to engage with the environment in order to solve puzzles and complete challenges. The endgame and its consequences were dependent on the course of action players decided to take. In this experience, players were given agency throughout, in that they were free to decide whether or not to follow the curator's requests at every step of the way, and those choices influenced the outcome of the story. This roleplaying and free agency encouraged them to give thought to the various ethical questions that arise from the gameplay, letting them choose what to do based on their beliefs and discussions. By leaving the outcome open, the designers of the experience refrained from telling players how to think, empowering them by involving them in the narrative's direction, and aiding the discussion by showing the players the possible consequences of their actions, as

well as varied perspectives from all the people involved in the story. The aim was not to educate, but to engage and encourage players to explore, while giving them ownership of the piece and the narrative (Mees, 2011, p. 91). Alternate reality games have the advantage of not depending entirely on the museum space as game world, as the game world starts to be built beforehand. However, this means that the experience is potentially more resource-intensive for designers, in terms of time, organisation and logistics.

Escape rooms can be a good fit for museums if the format is adapted to the fact that it is difficult to modify the built environment of a museum to incorporate the intricate physical puzzles representative of the format. While there is limited literature to be found regarding escape rooms in museums in the United Kingdom, they seem to either be enacted in a space separated from the galleries, or rely on the aim of 'escaping the museum' in a given amount of time. *Mystery in Frankenstein's Lab* (Atomic Force Productions, 2018) was available for a limited duration as part of a festival in the Science Museum in London, which celebrated the centenary of the publication of Mary Shelley's novel. The story, which was inspired by the novel, set the background against which players had to solve a variety of scientific puzzles in order to complete Frankenstein's creature, after the doctor has vanished and left his assistant in charge. Puzzles were connected to the museum's mission and collection insofar as they made use of different scientific instruments and experiments, as well as referencing anatomy, chemistry, the history of medicine, and exploring the ethics and limits of the pursuit of scientific knowledge. The experience lasted for forty-five minutes and brought together up to ten concurrent players who did not necessarily know each other prior to the experience, but had to work together in order to solve all the puzzles in time. The goal was to complete Frankenstein's work by finding adequate body parts for the body, without raising suspicions and without compromising on quality, and it was possible to reach different levels of completion according to how many parts players were able to find.

Beyond the scientific theme, the experience did not reference the museum, which combined with the fact that it did not make use of the space in any meaningful way, means that it is better described as site-sympathetic, rather than as a location-based game. *Mystery at Frankenstein's Lab* is included here as it is an experience that I played as part of this investigation, and so I am able to speak

about it in more detail, even though it does not exactly fit the criteria for inclusion. It is useful in the sense of pointing to the possibilities that were not followed by the designers of the experience. For example, the decision to create a pop-up escape experience in a temporary enclosure within a secluded part of the museum's galleries, and build a set for the experience there, gave designers more freedom to create complex puzzles from the ground up, but effectively shut players out of having any kind of immersion within the museum space. An alternative possibility would be to use the pop-up format to temporarily populate the museum's galleries with set design elements that incorporated the puzzles, while still making use of the surrounding environment. Another possibility would be to relate the game's theme of scientific experimentation to the objects that can be found in the museum, by directing players to those objects as part of the gameplay or during the debriefing of the experience. Ultimately, while the experience succeeded in engaging players with the theme, it did not enhance the visitor experience to that specific museum.

Other types of location-based games in museums include the use of digital gameplay technologies, most commonly accessed through players' smartphones. An example of this in the United Kingdom was *Capture the Museum* (Thought Den and Splash & Ripple, 2013), created for National Museum Scotland by companies Thought Den and Splash & Ripple. *Capture the Museum* was a capture the flag-inspired multiplayer game, in which two teams of up to fifty players in total roamed the museum for thirty minutes, solving puzzles in order to claim the different galleries as part of their territory (Templeton, 2013). The app showed players a map of the differently themed galleries which could be conquered by players physically accessing them and proving their understanding of the exhibits therein. The team that owned the most territories when the time was up was crowned the winner. According to the game designers, the aim was to engage players with the exhibits in order to score points, using games as a 'frame for exploration and risktaking [sic]' in an environment where 'content can sometimes overwhelm' (ibid). Players naturally engaged with the museum's space and exhibits while working towards the goal of the game. Unlike the experiences previously discussed in this section, this game does not include performers, and roleplay and story are not important. The social angle is explored through the inclusion of competitive gameplay, whereas the other experiences

mentioned in this section are solely cooperative. Competition, in addition to the time limit, has the effect of increasing the pace of the game, making it more high-energy and less contemplative. This has potential pitfalls: the added sense of urgency and competition urges players to move around the museum galleries faster, increasing the risk of incurring damage to their surroundings. Moreover, competition is not a game mechanic that appeals to everyone, and might actively turn some players away. One way to counteract these potentially negative effects, as can be seen in the next experience I analyse in this chapter, is to make moving at a respectful pace within the museum a rule of the game, and give players the choice of not being competitive while still playing the game. Nevertheless, in these experiences, exploration of the galleries and puzzle-solving related to objects are the primary goal. The focus is less on telling a story and immersing players in it, and more on encouraging their engagement by tapping into their puzzle-solving skills.

Several elements that can be found in the experiences described in this section can also be found in *Raiders of the Lost Archive* (Fire Hazard Games, 2016 - ongoing), a series of location-based multiplayer games which incorporate cooperative and competitive gameplay, puzzle-solving, environmental storytelling and elements from immersive theatre, with digital-based gameplay blended with the physical space of the museum, transforming it into a game board. These characteristics are combined into a distinctive form of gameplay experience, which I explore in the next section as a player-researcher.

Case Study as Player: *Raiders of the Lost Archive* (2016 - ongoing) by Fire Hazard Games

My focus as a player-researcher for this chapter is on *Raiders of the Lost Archive* (2016 – ongoing), a series of location-based competitive games played across different museums in London, created by Fire Hazard Games, a company with a team whose backgrounds include fine art, literature, theatre, stage design, dance, choreography, and videogames.⁴¹ In *Raiders*, players are invited to become members of the Wingback Society, a society of explorers who meet in the backrooms of pubs and other venues across the city, and set off on various

⁴¹ As part of this investigation, and similar to Blast Theory in chapter two of this thesis, I attended a research residency with Fire Hazard Games, during which I played several of their experiences, observed their design process, and interviewed members of the team.

explorations and investigations. The story and setting reference adventure series such as the *Indiana Jones* and *National Treasure* films, as well as drawing inspiration from detective, adventure and puzzle videogames (E. Simoens, personal communication, 10 January, 2018; see Appendix A.4.1).

Raiders started as a game created for the Victoria and Albert Museum, an indoors adaptation of a previous game called *Citydash*, a running game played in the streets of London. It has since grown into a series of variant missions for the Victoria and Albert Museum, the British Museum, and most recently the Museum of London, each of which focuses on specific themes inspired by the museum's collection and exhibition spaces. The games are also adapted to the space in which they are played. The Victoria and Albert Museum's eclectic collection of decorative arts and design objects, as well as the size and characteristics of the building, means that the space, while rich in possibilities, is not without its challenges. The labyrinthine quality of the galleries, which results in interesting possibilities for exploration, can also potentially confuse players who are not familiar with the museum. According to Fire Hazard Games, other characteristics of the space, such as line of sight for security cameras and guards, pinch points, crowd movement, and popularity of the exhibits, need to be taken into account, so that players do not interfere with the day-to-day functioning of the institution (T. Porteous, personal communication, 11 January, 2018; see Appendix A.4.2). In the case of the British Museum, the path that players take is more straightforward. The challenges are related to wayfinding, as many objects in the museum's permanent exhibition are similar in terms of visual characteristics, making it more challenging to guide players to certain objects and galleries. These limitations are incorporated into the games, as are the specifics of the collection, the architecture, and the history of the museums. The team's personal experience of the museums informed the creation of the different expansions of the game. For example, *Lost in Translation* was created from their observation of the fact that, in the British Museum, many objects include writing in ancient scripts, with the Rosetta stone being one of the most popular objects on show. *The Sunken Tea Set* was created after the team noticed the potential of a specific floor of the Victoria and Albert Museum dedicated to British life and made the connection with the cultural habits of the fictional Wingback Society surrounding tea (E. Simoens, personal communication, 10 January, 2018). The process of

choosing a theme and creating the game starting from the specific characteristics of the space and collection reflects the location-based character of the games.

Besides the *Raiders* games, Fire Hazard Games have created a similar game, *Codebreakers* (Fire Hazard Games, 2017 – 2018), for the Cambridge Museums, a consortium of eight museums and a botanical garden. Initially commissioned by Ina Pruegel, Cambridge Museums' Digital Engagement Officer at the time the game was created,⁴² the primary aim of the game was to increase the museums' visibility with a digitally-savvy audience, immersing them in a story inspired by the *Codebreakers and Groundbreakers* (October 2017 – February 2018) exhibition at the Fitzwilliam Museum (I. Pruegel, personal communication, 12 January, 2018). This temporary exhibition celebrated the codebreaking work carried out in nearby Bletchley Park, as well as tracing the history of codebreaking and cryptography from its origins to the present and possible future. The game sent players in a puzzle-solving expedition around Cambridge, navigating between different museums, where they had to compete against other teams to complete challenges based on the objects on display (see Appendix A.2.2). According to Pruegel, post-game surveys confirmed that the game succeeded in increasing footfall to the different museums, attracting a younger audience of experience seekers who were interested in games, but not necessarily in museums, and getting visitors to engage with the collections in a novel way (I. Pruegel, personal communication, 12 January, 2018).

For players, the experience starts when they purchase a ticket to one of the game sessions.⁴³ They are sent a unique link to a team setup page, where they can name their team, list the players in the team, and give themselves codenames. They are given the start location and the time of day they need to be there, as well as a list of instructions. Once players reach the starting location, actors performing as members of the Wingback Society greet and welcome them into the experience. The game's instructions are repeated by the actors at the beginning of the performance, framed in such a way that they become part of the game world. For example, there are references to the unruly behaviour of tourists,

⁴² This process is different to the *Raiders* games, which are created with the permission, but without the input of the professionals who work in the museums they take place in.

⁴³ This description is based on my various gameplay sessions. I conducted the first session as a paying customer in *Curatorial Cold Case* in 2017, with subsequent sessions, including all other *Raiders* games and *Codebreakers*, as part of my research residency in 2018.

which, if players partake in, potentially incurs penalties in the game, as opposed to the decorous and courteous behaviour expected of members of the Wingback Society, which might give them extra points if observed by crew members in the museum. This is a strategy employed by the game creators to minimise any potential disruptions to the museums, as the game is played during normal opening hours, alongside members of the public, who are often unaware that a game is going on. Players are given hollowed out vintage books in which they can put their smartphones for the duration of the game (see Appendix A.2.1). The purpose of this is manifold: to signal players in the museum, so that they are more easily identifiable by crew members and the museum guards, and also as a plot mechanism, to increase immersion in the story world.⁴⁴ Players are also given a map of the museum, designed in the style of old adventure maps.

The game is played during normal visiting hours in the museum, in the permanent exhibition galleries, which are free to access and open to the public, who are often curious about what players are doing and walk up to crew members asking what is going on.⁴⁵ Players are organised into teams of two to six. This game is both cooperative and competitive: team members must work together to play the game effectively, and while they do not necessarily have to interact with other teams, they have access to a live leader board during the game. Teams can choose to go to a certain part of the museum which has more puzzles to solve, or choose to solve puzzles which give them more points. In terms of team dynamics, only one smartphone per team is needed, so one person can be in charge of the device, while another might be in charge of wayfinding with the map, and others dedicated to find the objects referenced. In most teams, players huddle around the person holding the map, deciding where to go next, searching for wayfinding cues in the space. The player with the device reads the clue aloud and everyone searches for the information required. The puzzles can be logical, mathematical, visual, among other possibilities, and are based on the objects, exhibits, and architecture of the museums. Players can also talk to crew members, who roam the galleries as non-playing characters, to receive extra puzzles and points. The game ends with a debriefing back at the starting venue. In some games, teams

⁴⁴ In later games, this practice was abandoned for practical reasons and for the fact that crew members could rely on the use of maps to identify players in a museum.

⁴⁵ While crew members carry business cards to give to curious members of the public, from my observations, they would often stay in character during interactions with the public, responding to questions as members of the Wingback Society, rather than as crew in an event.

get points for arriving within the correct time, so as to prevent teams from staying behind at the museum, trying to acquire points after everyone else has started to make their way towards headquarters. Custom-made props, such as a treasure chest, a tablet with hieroglyphic inscriptions, and various other artefacts of fictional historical interest are used as part of the stage for the endgame. Once the story resolves, the top teams are announced and given rewards inspired by the theme of the story, such as a chocolate key in *Lost in Translation*, and a chocolate tea set in *The Sunken Tea Set*. After the game ends, players are free to stay in the venue and socialise among themselves and with the crew members.

Through my experience as a player-researcher (see Appendix A.1.1 and Appendix A.2.1), as well as conducting semi-structured interviews about the design process and the gameplay experience with the games' creators (see Appendix A.4.1 and Appendix A.4.2) and players (see Appendix A.3), I have identified several game elements and mechanics in *Raiders of the Lost Archive* and how they influence the museum visitor's experience.

The first consideration is the balance between player agency - in the form of choices for possible courses of action - and the constraints determined by the rules and goals of the game, which reflects the relationship between play and games, which I explained in chapter one, with games at the end of a continuum of increasing formalization and codification of playful activities (Stenros, 2014, p. 202). In larger museums such as the Victoria and Albert Museum and the British Museum, a more structured and guided visit may appeal to visitors who are unsure where to start and where to go, and on the other hand, to those who feel they have visited the permanent exhibitions enough times that they struggle to find something new in them. Moreover, playing the game during a visit is different from going on a normal guided visit, as it not only adds structure, but it also gives players challenges and goals to accomplish using their own choices and abilities. Similar to open-world roleplaying games, in *Raiders*, players are given directions at the beginning, then set loose in the game world, allowed to choose where to go, which clues to solve, and which non-playing characters to interact with. The path players take through the museum is not linear or set by the game creators, but it is not entirely left to chance and choice either: teams are given clues in a way that combines randomisation with calculated decisions regarding proximity of rooms and other teams. While players have choices regarding their paths and

actions, the agency they have is limited, because they cannot influence the story, which begins and ends always in the same way, no matter what players decide to do.⁴⁶ The experience is not co-constructed; rather, the designers create a structure within which players are allowed a set of actions to carry out. This limits the range of possible interactions for players, but it gives game creators and museums more control over the stories being told within their spaces and using their collection objects. In summary, as a player, having a balance between choice and constraints created by rules, challenges and goals gives the visit more structure, guidance and purpose than it would have during a normal visit to the museums' permanent exhibits. As a player, I had the choice of where to go and what to see next, but I could only choose from a limited set of options, which guided me to a greater variety of galleries and objects than what I would probably have seen during a visit outside of the game's context.

In *Raiders*, the main game mechanics are environmental puzzle-solving and exploration. Puzzles require players to engage in the physical exploration of the space in order to find the necessary information and to intellectually engage with the objects, facts and information found in the museum. While playing, I was aware of the fact that I was looking at the artefacts and the information around me with the specific purpose of finding the clues necessary to solve the puzzle, limiting any knowledge acquisition to what was included in the puzzle. However, most puzzles require players to look closely at objects, and in my case and that of the team member who accompanied me, information acquired this way was retained and we were able to discuss it after the game. This process of learning new facts without noticing, through stealth learning, was mentioned before in this chapter (MacCallum-Stewart, 2011). Moreover, it is likely that, if not for their inclusion in puzzles, I would have overlooked many of the objects in question, or not have spent as much time reading about and trying to understand them.

As for exploration, in *Raiders*, moving through the museums' galleries is required to find new puzzles to solve, which award points that bring players closer to the goal of winning the game. The path that players take cannot be described as a quest, as it is not a transformative experience but a spatial journey in the physical space during which players carry out the challenge of solving puzzles. This

⁴⁶ This differs in *Cambridge Codebreakers* (2017 - 2018), in which players were given a choice during the endgame that resulted in two different endings.

emphasis on exploration with a goal in mind adds structure and purpose to the museum visit. It also has the potential to take players to overlooked galleries. For example, while playing *The Sunken Tea Set* at the Victoria and Albert Museum, I visited galleries that I had never been to before, even having visited the museum dozens of times in the past. Access to the galleries included in the game is less obvious than the better-known galleries in the museum, which translated into fewer numbers of visitors besides those playing the game. In summary, puzzles and exploration can be used in games as a strategy to direct players' attention towards otherwise overlooked artefacts and galleries, and to create opportunities for learning information about them.

The fictional story in *Raiders* serves as setup and denouement, but the gameplay itself is independent of it. The story can be considered a justification for players to solve puzzles in a museum; nevertheless, its inclusion is useful as background and ambiance. As shown in the previous section, fictional stories can make the museum and the information therein more accessible and relatable to visitors who do not have previous or specialised knowledge. Stories have the potential to introduce a sense of drama and wonder to the fact-based exhibits. Moreover, the various cultural references to existing adventure films and games serve not only to add ambiance, but also as storytelling devices: by anchoring the story in easily recognisable cues and references, the game designers minimise the need for exposition.

Roleplaying is not a central element to the game, since players are not given a specific role to play beyond 'members of the Wingback Society', which requires players to position themselves as explorers, puzzle-solvers and adventurers. In a way, their backgrounds, personalities and previous experiences only matter to the game insofar as they are people who are interested in games, museums, or both: their role in the game is driven by their actions. Participation beyond puzzle-solving is encouraged through interaction with the actors, who address the players directly during the briefing and debriefing stages and during the game when encountering them at the museum. There are often spontaneous additions to the performance by the actors, who become a crucial part in the experience, creating social interactions, immersion, and contributing to storytelling. In this, the game designers draw inspiration from theatre, in that they think of the museum building and its contents as a space in which physical cues are used for

storytelling, building puzzles, wayfinding, and to create ambiance. As a player, the interactions I had with actors naturally fell into a light and transitive form of roleplay, during which I addressed them as their characters. The rest of the time, I was only aware of my role as a player, and of the responsibility of not disrupting the experience of the museum for anyone outside the game, while still attempting to play the game efficiently in order to earn points.

The digital system that supports *Raiders* and its interface are what differentiates it from more theatre-oriented immersive experiences, as well as paper-based treasure hunts. Supporting the game with a digital system means that the game can give immediate feedback to the players, letting them know if their answers are correct, and instantly adding to their scores on the leader board. The fact that the digital component is a website, rather than an app, is an advantage for several reasons: it does not require downloading, works seamlessly in most devices, and rather than being something complicated that players need to learn to navigate, it is a simple system of links and boxes into which they can write their answers. This allows the technology to become almost invisible, so that players can more easily enter the flow of the experience. While a location-based game does not necessarily have to include digital components, when relying on digital technology, it is an advantage to make it unobtrusive and easy to use, so that it becomes almost invisible to players.

It is common for players to give feedback to the stage managers - the crew members who run the game - saying that they would have liked the experience to last longer, so they could keep exploring the museum and solving puzzles. Some have suggested that it should be available without time constraints, freely playable whenever they wanted. As becomes apparent in the next section of this chapter, this specific feedback is common whenever players take part in an experience that is designed to be limited in time. With limited time available, a feeling of urgency is created, and players have to carefully strategize their time, balancing the choice of where to go and which puzzles to solve by considering how much time they have to get to a certain location, how easy it is to get there, and how many points they can potentially gain from solving a puzzle. This can leave players wishing they could have done more, and may contribute to encouraging future repeat visits, both in the form of other *Raiders* game sessions and regular visits to the museum.

These games are location-based, insofar as the gameplay arises from the characteristics of the museums, their architecture, spatial environment, and collection objects on display. The designers take the existing rules and cultural cues of the museum environment, which players are already familiar with, and incorporate them into the game as rules. The game integrates the museum not only as space, but also as place, that is, the memories, experiences and rules of the location are taken into account, not just its formal and physical properties (Davies 2007). The museum space is incorporated into *Raiders* in the way the game uses place in the gameplay, and also in the story and themes of the game, which reference the spirit of curiosity and exploration inherent to museums. The result of this characteristic is that each game can only be played in the specific museum that it was built for, so players cannot find the same experience anywhere else, which is beneficial in terms of creating engagement and encouraging people to visit the museum.

In terms of creating and sustaining motivation to engage, as related to the basic human needs for autonomy, competence, and relatedness (Ryan and Deci, 2000), as seen in chapter one, the response to these needs is present in *Raiders*. Competence emerges when players feel satisfied with finding the correct room in the galleries and using their skills to solve puzzles; the sense of autonomy is given to players by their agency in choosing where to go, which clues to solve, and which ones to skip; and feelings of relatedness emerge not just between team members, but also with the other teams and the performers. This is achieved by a sense of community, of being welcomed into a secret society of like-minded people, and the inside jokes included in the story, characters, clues and objects in game. While cooperative gameplay has these benefits, it is possible to find potential concerns with the use of competition. For some players, it can add to their motivation to play, whereas for others, it is a detriment to the engagement with the museum, and they might feel discouraged when they see their position in the leader board relative to more experienced players. While this does not mean that competitive games have no place in museums, it is an aspect that requires careful consideration from designers. The feeling of competence derived from solving puzzles creates an enjoyable experience for players. The satisfactions inherent in understanding the game system, mastering the core mechanic, coming up with a strategy, developing skills and abilities, competing

against and cooperating with other players, overcoming the challenge, and reaching the goals of the game, are important factors in making a game fun. In addition, the references to popular culture, inside jokes, and interaction with the performers contribute to creating a high-energy experience that manages to be both entertaining and informative. All of these elements make the visit to the museum more purposeful, active, and immersive.

Raiders of the Lost Archive is an example of how various game elements and mechanics can be implemented by game designers in order to incorporate the museum space into location-based games, in order to create engagement and to give players different ways to experience that space and the objects therein. The following section in this chapter is dedicated to the design and gameplay analysis of the case study in RAMM, which takes into account several of the game elements studied previously in this chapter, and also implements different game design strategies, in order to compare the results with existing knowledge.

Case Study as Game Designer: *The Rowley Riddle* (2018)

This section is dedicated to the design process and analysis of the gameplay experience in *The Rowley Riddle* (Red House Mysteries, 2018), a location-based game created for RAMM as part of this investigation, in order to study the effects on players' experience, motivation and engagement of incorporating the museum space into the design of games. The game was developed by a commercial company, Red House Mysteries, following design specifications I established with the input of RAMM's collections team. In this section, I describe the game design process and the resulting gameplay experience. For the analysis of gameplay, as in previous chapters, following the examination of my gameplay experience as a player-researcher of existing games, in this section, I focus on the study of the gameplay experience of other players. To do this, similar to the other case studies, I conducted an observational study and semi-structured interviews with five teams of players during the first session of the game at RAMM. Besides the baseline questions detailed in the methodology, these interviews focused on the experience that players had during the game, the team dynamics, the puzzles, and the ways they engaged or failed to engage with the museum space and the objects exhibited. From the observations and player responses, I analyse the game elements and mechanics applied in this

experience, and the corresponding effects on visitors' experiences, motivation and engagement.

The Game Design Process

The incorporation of the museum space into the design of a game starts with an understanding of the specific characteristics of that space, in this case, RAMM's building and exhibition galleries. Completed in 1868, the museum's original Victorian building was expanded and redeveloped between 2007 and 2011 to include a new entrance and exhibition spaces, as well as to integrate all the sections of the building into a coherent whole. Making the building an integral part of the game design strategies is particularly productive if the story told by the game reflects or refers to the museum's origins and identity, which was one of the first design decisions made for the project developed for this chapter. The exhibition design of RAMM's galleries ranges from immersive architectural elements which evoke the cultural context of the objects exhibited, as is the case of the Egyptian Archaeology gallery, to complex dioramas, with varying degrees of realism, populated by the museum's taxidermy collection, to neutral and adaptable spaces designed to accommodate temporary exhibitions, to a gallery that has maintained the museological strategies of the museum's origins, designated Sladen's Study, which has remained unchanged for more than a hundred years. The evocative and immersive power of these spaces can be incorporated into the story told by the game, to the puzzles or challenges created as part of gameplay, or simply as part of the game environment. As a heritage museum focused on a specific regional context, RAMM's collections reflect and document the natural and cultural history of the city of Exeter, the surrounding regions, and the connections between the city and the rest of the world. The permanent exhibition galleries reflect the museum's aim to be a place where visitors can be inspired, informed and entertained, with multimodal displays that highlight facts, curiosities, and engage the visitors' creativity through interactive experiences.

Similar to the previous case studies of this investigation, for the development of this game, I created a game design brief in collaboration with the collections team at RAMM, which included the design specifications that external collaborators were required to follow, as well as logistical and practical requests from the museum team (see Appendix D.1). As long as these basic requirements were

met, external game designers were welcome to add input and develop the game according to their skills and creativity, with guidance from me and the museum team. In this case, the external collaborators were Exeter-based company Red House Mysteries, headed by game designers Mark Nicholls and Ben Pering, who specialise in building escape rooms, interactive mysteries and other puzzle-based games.⁴⁷ Red House Mysteries were responsible for creating the game according to the design brief, and used their expertise and experience to develop the story and puzzles with input from me and the museum team.⁴⁸

The game design brief included guidelines for the creation of a location-based game with puzzle-solving and light roleplaying elements, which made use of the museum's physical spaces and collection objects in the permanent exhibition, with a story grounded in the history of the museum, giving players a role to play within it. In terms of the use of the space, the game needed to rely on the environment for storytelling and puzzle-solving, making use of the physical characteristics of the building and its galleries, particularly when they reflect its history, as well as the evocative power of the objects exhibited. Additional props and objects could be used for set design, to aid in the creation of ambiance and to facilitate gameplay. Players should be required to move around the museum, exploring, paying attention to their surroundings and looking for clues, some of which should be directly related to the museum's architecture and objects in the permanent collection displays.

As for the game's story, it needed to be related to the history of the museum, with the participation of characters inspired by their real counterparts. However, while historical accuracy was important, we maintained flexibility for imagination and make-believe, if it suited the story and gameplay. This included the use of artistic liberty when developing characters inspired by real people, the creation of fictional, but historically accurate characters, the use of anachronisms, and the

⁴⁷ Their previous work includes *The Curse of Amenhotep*, an interactive murder mystery set in the Torquay Museum in which players have a limited amount of time to find clues spread throughout the museum and solve the mystery by identifying the culprit in the story. While this work qualifies as an escape room style of game in a museum, it is not purely location-based in the sense that the story is not specific to the museum where it is played.

⁴⁸ At the time of this game's development, I was conducting the research residency with Fire Hazard Games. In order to respect the non-disclosure agreement with that company regarding methodologies for building puzzles, my input into the game created by Red House Mysteries comprised the game design brief detailed here, and guidance regarding the story of the game. I did not have creative input in the process of creating puzzles.

use of fictional narrative devices such as time traveling, among other possibilities. The story should give players the opportunity to step into a role, such as that of an explorer, time traveller, or curator's assistant in order to encourage their emotional, as well as intellectual, engagement with the museum and investment in the story. The exact setting, plot, mystery, challenges and roles for players to play was to be developed by the game developers, with my assistance and that of the museum team. In terms of game mechanics, besides puzzle-solving, the game should focus on cooperation between players, rather than competition. Time limits were to be included to create a sense of urgency and make the experience more challenging. Finally, while initially we planned for the game to be played after normal museum hours, once the galleries had been closed to the general public, in order to minimise disruptions and facilitate interventions upon the space, this idea was later abandoned in favour of running the game among non-playing members of the public, during regular visiting hours, as this was deemed to be more cost-effective for the museum.

The result of this design process was *The Rowley Riddle* (Red House Mysteries, 2018), a sixty-minute 'escape the museum' style of game. The game's story drew inspiration from Frederick Richard Rowley (1868-1939), one of the foremost curators in the history of RAMM, who worked in the museum for more than thirty years and was responsible for the development of the collection, as well as for the curatorial design of Sladen's Study, which has the same arrangement today as it had when it was developed by Rowley in 1910 (RAMM, n/d). The story is set at the time of Rowley's work with RAMM, and players are told that the curator, who has been traveling around the world for months acquiring objects for the collection, has sent a riddle for them to solve before his impending arrival from London. In addition to the start and end game, players travel through four different galleries in the museum, spending ten minutes in each one solving puzzles that give them access to part of the final riddle. If they succeed, they open a final box left by Rowley, in which they find a token of appreciation in the form of a pin congratulating them for having successfully completed the game and solved the riddle. The story was inspired by the museum's history and mission, and the puzzles made use of the space, meaning that the game could not be played anywhere else without being considerably changed, fulfilling the requirement of being specific to the museum in both the puzzles and story. According to Ben

Pering of Red House Mysteries, this strategy informed the decisions regarding environmental storytelling, namely the props added to the space to help tell the story and create puzzles:

As the museum exhibits themselves can't really be interacted with by the players, we came up with some concepts of things we could place around the museum to create set pieces that players could get their hands on. This led to the creation of the rough story outline - Richard Rowley leaving an enigmatic challenge after his recent travels, meaning we could then source a packing crate, a travel trunk and other such relevant pieces, and make the links between them be facts and figures from the museum - without it breaking the world of the story or straying too far from including the history of the museum as a resource. (B. Pering, personal communication, 13 April, 2018)

The requirement to incorporate the surrounding environment into the game translated into considering the characteristics of the museum's building as part of the gameplay, as well as details in the galleries as part of the puzzles. The combination of historical and modern characteristics in RAMM's building is conducive to the creation of stories and puzzles inspired by both past and present, as possible anachronisms would not look out of place, and this allows the game to communicate stories that combine RAMM's history, namely a historical curator and the activities he would have been involved with, including exhibition making, travel, research and collecting, with present day galleries and exhibits. According to Pering:

The process of creating the game came from studying the museum and the way it could be utilised to create a particular feel and flow. Exhibits such as Making History and Sladen's Study are particularly evocative and lend themselves to exploring the history of the museum in the game. We also needed to pick exhibits that could flow as a route for teams to follow without bumping into each other or overhearing each other as they played. (B. Pering, personal communication, 13 April, 2018)



Figure 4.1. A volunteer prepares one of the locked boxes that is added to Sladen's Study as part of the *The Rowley Riddle*. Photograph: author's own.

The galleries in which the game is played were chosen for the evocative power of the architecture, the exhibits and the objects therein. Puzzles incorporate the architecture and objects, both the ones in the museum's collection and included in the permanent exhibits, as well as objects created specifically for the game and added to the space. Players travel through four different galleries in the museum, starting in the Down to Earth gallery, traveling to the Making History, then to Sladen's Study, and finally to Case Histories (see Appendix D.3). The Down to Earth gallery is the first to be visited by the public if visitors are following the chronological order of the galleries. Filled with objects from the museum's geology collection, the puzzles in this gallery, which include finding codes to locked traveling cases sent by Rowley, are based on artefacts related to the origins of the Earth. The adjacent Making History gallery is dedicated to the history of Devon and Exeter from prehistoric times to the nineteenth century, and the puzzles make use of objects such as the Seaton Down Hoard of Roman coins and eighteenth-century shop signs. Additions to the space include more suitcases and a projector with a message coded by nautical flags. The third space, Sladen's Study, is a display of eighteenth century collector Walter Percy Sladen's collection of echinoderms. The puzzles called attention to details in the space, as well as referencing Sladen's scientific explorations by requiring players

to make use of objects such as a microscope and a spyglass (Figure 4.1). Finally, the Case Histories gallery is dedicated to taxidermy specimens acquired for the museum, and has a world map that shows the global origins of RAMM's collection, where the final key of the game could be found. All of these galleries are turned into game boards, not through the addition of a digital game layer, but through the use of the evocative power of objects for storytelling and puzzle-solving, as well as through the addition of props that contribute to transforming the museum space into something more akin to theatrical space, in which the game is then enacted.

The development process for *The Rowley Riddle* was largely directed by the Red House Mysteries team, with frequent feedback and course corrections from myself and Rick Lawrence. The initial proposal from Red House Mysteries was based around an adventure story which, while engaging and thrilling, did not meet the requirement of being location-based, that is, while the puzzles were based on the museum's space, the story itself did not directly reference RAMM, which meant it could be played in any other museum without significant alterations. Following meetings and discussions, the Red House Mysteries team proposed focusing the game's story on Frederick Richard Rowley, a long-time curator from the history of RAMM, a proposal which meant the project fit with the aims of the investigation. The Red House Mysteries team devised the puzzles which used the museum space and objects on exhibition, as well as the props that were added to the galleries. These props were sourced and modified by Red House Mysteries with little feedback from the rest of the team, as their expertise and creative contributions as game designers and creators of physical puzzles was a welcome part of the collaborative design and development process, similar to the relationship established with game designers during *Minecraft at RAMM*.

The logistics around the game had to be changed according to the resources that the museum had available. Initially, we wanted the game to be played after hours, without the presence of other visitors, an idea which had to be abandoned due to the costs of keeping the museum open outside of regular hours. This game also provided challenges due to the use of props in the museum galleries, which had to be looked after and reset by volunteers and museum staff. This cost in personnel and resources was offset by the relatively low development budget for the experience, which was compounded by the fact that the experience did not

make use of digital technologies (see Appendix D.1). However, the addition of props meant that the museum was required to allocate storage space and upkeep time to the props while they were not being actively used in the game. Nevertheless, in terms of monetary investment, this experience is accessible and relatively inexpensive to run once it has been developed, making it an attractive option for museums that do not have enough resources for games that use more costly digital technologies. Finally, had the in-situ playtesting phase for the project been more extensive, the disparity in difficulty of certain puzzles could have been remedied prior to launch. As it stands, this illustrates the importance of playtesting and continuing to modify the experience after it is launched.

The Gameplay

This section is dedicated to the description and analysis of the gameplay of *The Rowley Riddle*, based on a gaming session in April 2018, involving five teams with five players each. Players for the game's first session and data collection were paying customers who the museum and Red House Mysteries reached through publicity on social media. Teams were open, which means that a group could buy all the tickets for a game session, or get partnered with strangers if playing alone or in a smaller group. While the game was primarily aimed at adults, children were allowed to get involved if accompanied by an adult, although they were then not part of the observation and interview process. The type of players who participated ranged from escape room aficionados, who described having played together through similar experiences before, including those created by Red House Mysteries, to people new to games altogether. According to the post-game interviews, there was a difference in perception of difficulty in the puzzles, depending on previous experience with escape rooms and other games, suggesting that regular players have developed gaming literacy. This also suggests that there is no one-size-fits-all when it comes to designing puzzles, so a possibility for museums could be to design several games of varying difficulty to cater to players with different backgrounds and experience.

Regarding team dynamics, players worked together in each room, huddling around a puzzle, and then spreading through the gallery to find the objects or information needed, calling their team mates over when that happened (see Appendix D.4). Players mentioned that they were initially wary of playing with strangers, as there was the danger of not communicating as effectively or having

one group or person dominate gameplay. However, in these game sessions, players mentioned the positive experience of meeting like-minded visitors as part of the game:

SR: Did it work well, playing in a team together with people that you didn't know before?

Player 3 (team 1): Surprisingly yeah, because we were a bit unsure [...] but I think they were really welcoming, and they weren't domineering, and we worked well as a team. So yeah, it was good.

The gameplay was exclusively analogue, which meant that players were guided in their exploration by messages embedded within the puzzles and through the help of museum volunteers. The puzzles included as part of gameplay were inspired by those found in more traditional escape rooms. As mentioned, the perception of puzzle difficulty by players varied according to their previous experience with escape rooms, with experienced players needing less time and fewer hints than new players. However, during the interviews, players consistently referred to the endgame puzzle as too easy. Even the players that complained about the difficulty of the other puzzles voiced their disappointment with being able to easily solve the last riddle, as opposed to solving puzzles in the cusp of time as in the other rooms included in the game. This confirms that the game design strategy of gauging the difficulty of challenges, so that they are on the edge of players' abilities, enabling the feeling of flow (Csikszentmihalyi, [1990]), does influence player motivation and enjoyment, as mentioned in the section on motivation in chapter one. It also demonstrates that this particular puzzle failed to do that, which is something that could be changed following the iterative game design process of tweaking the game after it is launched. Other puzzles were more successful: several players, both first-time visitors to RAMM and those who had visited many times before, mentioned their enjoyment in noticing details in the architecture they would not have looked at if it were not for the game, and in having their attention guided to objects they would have otherwise glanced over.



Figure 4.2. Playing *The Rowley Riddle* among regular visitors. Photograph: author's own.

Playing the game during normal visiting hours for the museum had the effect of sparking the curiosity of bystanders, who often stopped their activities to examine the props added to the galleries as part of the game, and who engaged the players and volunteers in conversation in order to understand what was happening. This occurs often in games that are played among non-playing visitors, and can also be observed in *Raiders*. Gameplay here turns into a type of spectacle, insofar as it produces publicly visible effects (Watson, 2012, p. 49). This underscores the importance of always having crew or volunteers in the galleries to communicate with the public and make sure that gameplay occurs smoothly. One volunteer in each room accompanied the players, keeping track of the time players spent in each room, giving them clues if they were stuck on a puzzle, and resetting the puzzles for the following team. These volunteers were not actors, and therefore performance was not part of the game. Their presence was akin to that of game-masters in escape rooms, making sure that the gameplay ran smoothly among the rest of the public. Volunteers were given a script to follow in terms of resetting the puzzles, and how they could be solved, but other than that, they were given freedom to help players as they wished. This led to an emergent dynamic in which volunteers created spontaneous additions

to the game, personalised to each group of players, which in turn can help with engagement if museums decide to train volunteers in that direction:

Player 3 (team 3): Yeah, I think it was well designed. None of it was too difficult to achieve in the time.

Player 2 (team 3): But it wasn't really easy either, in that there were some that we did struggle with a bit. It's a good level, I think, for most people.

Player 3 (team 3): I think having the ability to being there and getting a slight hint if you're stuck... There was one of them in which you had to look up, and we weren't getting that it was actually in the frieze up in the room. I don't think we would have got that without a clue, so it's good to have that if you need it.

Player 1: No, so it's nice to have the assistance there, so somebody can actually point us to, no, actually you're looking in the wrong direction.

The story in *The Rowley Riddle*, as previously mentioned, is inspired by the origins of the museum, giving players the opportunity to engage with and learn about the museum's history and the characters that helped shape it. Similar to *Raiders*, the story is included as background and to help create ambiance and motivation. The storytelling is linear and pre-determined, that is, there is no space for emergent storytelling, and the players cannot influence the narrative. Roleplaying is limited, as the role given to players is not developed beyond them having been given a task by the curator. Moreover, unlike in *Raiders*, in *The Rowley Riddle* there are no actors to perform the roles of characters within the story. As such, roleplaying becomes even less prevalent, and the story is relegated to background context and motivation to play. This suggests a possible thread of further research, in terms of creating deeper and more involved forms of roleplay, possibly in the form of a live-action roleplaying game, and analysing the effects that has on identification with the museum and its history, as well as empathy and emotional connection with the characters, story and theme. Nevertheless, the presence of the story, no matter how simple, helps create context for players' actions and gives them an initial motivation to engage with the game:

SR: You mentioned the story as well. What did you think about the story of the game?

Player 4 (team 4): It was a different kind of story. It was kind of, you had a clear rationale. There wasn't so much story through the game, but it's nice to have that bit of context to why you're doing it, as opposed to just, here are some puzzles to solve.

Immersion within the game is achieved by the use of the environment as part of the story. The museum's galleries and the objects therein are evocative enough to give players a sense of being immersed in a particular story world, and the addition of custom props aids in the creation of a more theatrical space that evokes the story, the past of the museum and its characters, while still being grounded in its present day characteristics. The story already being told by RAMM's building is one that combines its Victorian origins and curiosity with modern sensibilities, and this combination is also incorporated into the story, which references both the past and present of the museum's story and collections, as well as tying the narrative directly into the architecture. This makes this experience closer to traditional escape rooms, with the difference that players know they are interacting with a space that is authentic, rather than purposefully built for the game. There is also more freedom for players to walk around and explore than in a traditional escape room. When asked to compare the experience to traditional escape rooms, players agreed on the positive impact of the differences:

Player 4 (team 3): You can move around, whereas the ones we did previously, are just in one space.

Player 1 (team 3): In one room.

Player 4 (team 3): So there's the extra challenge of not knowing... If you've only got one bit, it's a little easier to find things, because there's a limited space, whereas if you have a big gallery, it could be anywhere. In some cases, we weren't clear whether if it was just one room, and the guys had to say, no, it's definitely in here, because we thought it could be next door. It's a bit more limited when you're in just one room.

Player 3 (team 3): There's more environment involved with the story, isn't there? I guess, so it's more interesting.

Player 1 (team 5): I actually really liked it. Especially because it was also broken up into rooms. I quite liked sort of doing one room, and then moving on to another, whereas in an escape room, you're in one spot, and you get very familiar with that. With the museum, you can go to different places.

Exploration in *The Rowley Riddle* is more limited than in games such as *Raiders*, as players cannot choose which gallery to go next when exploring the museum, and must instead follow a linear path through the game. Wayfinding for players was not a concern for the game designers, as players are directed to the next space by volunteers and messages within the game, and if they get lost, they can ask the volunteers for help. This makes the gameplay, and the exploration of the

museum, more restricted and guided. While restricting their freedom, it does leave players to focus solely on the puzzles. It also allows the museum to create a more tightly controlled experience, as museums can know exactly where the players will be and what they will interact with in any given gameplay session. However, this does not guarantee that players learn from the game, only that they will engage with parts of the museum and certain objects exhibited during gameplay.



Figure 4.3: Inscription in Sladen's Study, a detail from the spatial environment incorporated into a puzzle.

When it comes to learning, the usefulness of the game to reach specific objectives is debatable. Similar to what I found in *Raiders*, many players mentioned they did not pay a lot of attention to learning about the objects because they were concentrating on playing the game, and therefore learning only the exact information needed to solve the puzzles. Nevertheless, when questioned about certain elements of the game, many players were able to easily recall the information referenced. This confirms the initial hypothesis that using games to create learning as a by-product, as opposed to making it the primary aim of the game, is beneficial, as they are conducive to stealth learning. Specifically, some players mentioned they examined objects they had never noticed before, despite being regular visitors to the museum, such as the hammer shop sign hanging from the ceiling in Making History gallery, or the Pangaea map in the Down to

Earth gallery. This was also the case with architectural details, such as the wall inscription in Sladen's Study (Figure 4.3), among others:

Player 2 (team 4): I never noticed that writing on the ceiling before. And I'd never paid much attention to the map with the different parts of the world that different animals live in either. It's just there.

Player 3 (team 2): I learned what Pangaea meant. Yeah, it's just taking little bits of information, isn't it? Like knowing that [the museum] was inspired by Albert's Great Exhibition. It makes sense, but you just don't know that until you look it up. It's something that I would have just scanned.

Player 2 (team 3): You probably get up to [the objects] a bit more, study them more closely if you're looking for a clue, because you're looking at little bits to see if it's there.

Player 3 (team 3): I hadn't seen them all, so it was a good way to make me look around and, you know, seeing some of those fossils and things. I actually hadn't been in that part [Down to Earth gallery] before. So yeah, it was good.

Several players mentioned the time limit as a limitation to learning (see Appendix D.4.2). However, many admitted that without it, there would not be pressure to solve the puzzles and keep exploring, their motivation to play would likely decrease. This is compounded by the fact that, in this game, there is no competition between players or teams, which may contribute to reducing the pressure to perform, but may also reduce motivation for certain players. This suggests that the addition of time or competitive pressure to a museum visit, as part of a game, is a way to create motivation to keep playing, and an encouragement to come back to the museum for a more traditional visit after the game, which suggests that location-based games may work as introductions to the museum. Players mentioned that the game made them want to come back to the museum and look at the objects referenced with more time:

Player 3 (team 1): Now I'm here, if I had time I would go around. But I will come back and see everything at a much more leisurely, less stressful pace.

Player 3 (team 2): Well, it felt more rushed, and I guess I didn't have time to take anything in, really, rather than specifically what we were trying to do for the puzzles. I don't know... Yeah, it would be nice to have puzzles that you could do in your own time, so you have time to, like, take everything in. Obviously, there's fun about having to do something quickly. But yeah, from the museum's point of view, I'd say you'd wanna have a puzzle but you've got loads of time, all the time to do it. But you'd have to find, you'd still have to find an answer. But then you can take your time to look at everything.

Player 2 (team 5): This will stick in my memory more [than a regular visit], but for different reasons. So I probably enjoyed this more, but it does feel a bit rushed. But then you need the time limit to be part of the game. Maybe if we were here in an earlier slot, we could do the game and then wander around afterwards or something, that would be different.

Player 4 (team 3): [Having a time limit] probably rushed us, we probably didn't pay attention to all the...

Player 2 (team 3): But then it made it more exciting, because it's hard, and you have to do it quickly, and it made us work together a bit better.

Player 4 (team 3): And I guess it makes people come into the museum for the game, and then, because you don't take everything in, you just visit again. See what you've missed.

The Rowley Riddle is location-based as it was designed in response to the unique qualities of RAMM, which could not be found anywhere else, including its history, characters, architecture and collection. This helps players engage with and learn about what makes the museum unique, while immersing them in an experiential and physical context that is thematically related to the challenges they are given. The design of the game as location-based helps educate players about the place in which it is played. The conclusions from the analysis of *The Rowley Riddle* and the experience of its players are similar to the ones already found in *Raiders*. These types of location-based games create an initial impetus for people to visit the museum, as well as a curiosity inherent in the challenge proposed by the games. These experiences attract both new audiences and existing audiences that may feel that the museum's permanent exhibits no longer hold significant interest for them:

Player 1 (team 2): This is a really good thing for the museum, because obviously, they have changes in some of the exhibits, but a lot of it is still the same, so it's nice to be able to explore it in different ways. So it's about how you come across those items, rather than what you come across. So it's a way for us, who have visited before, we can still come back and do something new and exciting.

Player 1 (team 5): Yeah. I think I would need that to pull me here. I mean, I haven't been to the museum since I was a kid.

SR: So the game actually made you want to come back?

Player 1 (team 5): Yeah. I think it brings you into the museum. I haven't been here in years. I would probably have to do a game like this, or if there was... I would come to the museum, more likely, if there was an interactive thing like this here, that we could do, and then stay afterwards. It would make me want to interact with the museum again.

This game offers visitors the possibility of visiting the museum in a gameful and structured way, with challenges, rules and a goal. This increased purpose, when compared to what visitors would get from an unguided visit, or a guided tour that does not require them to actively participate, attracts a segment of the museum's community that seek new experiences, motivating them to visit. Many players mentioned this increased structure as beneficial for engagement:

SR: How different was this experience today from other times that you've visited the museum and didn't play a game?

Player 3 (team 3): More exciting.

Player 1 (team 3): It was much more fun, more exciting.

Player 4 (team 3): You've got purpose, so it sort of informs what you look at, because it's easy to sort of aimlessly wander around, I think. Unless you're particularly interested in something, you just sort of look through things, whereas with this, you've got a challenge, a goal.

Player 2 (team 3): You have to look at everything, whether you're interested or not.

Player 4 (team 3): Yeah, it definitely makes you pay attention to extra things in the museum.

Player 3 (team 3): I think actually, you also have, having the story behind the game, kind of fits you into the museum. The curator is coming, and he's set you this challenge...

Player 2 (team 3): It brings it to life a little bit.

Player 3 (team 3): Yeah. It sort of highlights certain parts of certain exhibits, you might then come back and go, ah, I'm going to go back and read more about that, because that's really interesting.

In summary, the use of location-based games to encourage engagement with the museum space and collections, to highlight particular objects, and to encourage players to learn as part of gameplay seems to be successful. These games attract new audiences to the museum, as well as encourage existing audiences to come back and re-discover the permanent exhibits. As for creating motivation to engage through encouraging feelings of autonomy, competence, and relatedness (Ryan and Deci, 2000), as in *Raiders*, these are present in terms of puzzle-solving and cooperation, but the freedom and agency given to players is diminished, which may affect their sense of autonomy. From player feedback, these experiences are fun and motivating, and several players mentioned they would come back to play similar games. They are also conducive to learning information as a by-product of gameplay. However, in terms of specific learning outcomes,

these games cannot be considered key ways of communicating information to players. Having a time limit may increase motivation and the thrill of playing, but it decreases the possibilities for learning and developing interpretations of the objects and space beyond that which is directly referenced in the game. Nevertheless, during these experiences, visitors are intellectually and socially engaged, active, curious, and motivated to keep exploring and interacting, expanding the possibilities for experiences during their visit.

Conclusion

This chapter was dedicated to the incorporation of the museum space and its characteristics as major parts of the design of location-based games, using game elements, mechanics and design strategies such as environmental storytelling, exploration, puzzle-solving, time limits, and cooperation, and analysing the effects on visitors' motivation to visit and engagement during their visit. As in previous chapters, I began by analysing the museum space and identifying potential gameful qualities in existing structures and characteristics, so as to decide which game elements potentially fit them. Following the study of existing examples of games developed by museums, I selected one of those games as an example of the application of these elements and strategies to analyse as player-researcher. Finally, I contributed to the design and analysed the design process and gameplay of a location-based game for RAMM, in order to analyse other players' experiences with that game and the effects that playing had on their museum visit.

Several key findings can be identified. These games create increased motivation for people to visit the museum, a finding that was observed both in the creation of new audiences, consisting of members of the public who do not usually go to museums, but who are attracted by the prospect of playing a game, and by bringing back visitors who have visited a particular museum so often that they feel the permanent exhibits do not hold anything new to them. This motivation to visit is created as part of the activity of playing. Beyond motivation, these experiences are conducive to improved engagement opportunities once players are inside the museum. As part of the gameplay, players' attention is directed towards objects, architectural details and places they may not have seen or paid attention to otherwise. By including them as part of the puzzles, players naturally engage with them more actively and purposefully. Moreover, players said that

playing the game made them want to come back to the museum and engage with its exhibits at a more leisurely pace. This suggests that these games may be better suited as gateway experiences, to attract people into the museum, to engage them naturally as part of gameplay, and to introduce them to the museum as a space they can enjoy themselves in and engage with more deeply with in the future.

As places for both entertainment and learning, it is important that these games are enjoyable for players, and also create opportunities for learning. While learning does occur as part of the gameplay, results suggest that these experiences are not successful in having learning as their primary aim. Knowledge acquisition occurs as a by-product of gameplay, but the time limit and competition elements of these games may be harmful for learning, as they place the emphasis of the experience on doing just enough to play the game successfully. However, the fact that players remembered new information they had to learn as part of puzzle-solving suggests that learning does occur. Ultimately, these games fulfil the brief of this investigation, that is, creating gameful experiences that transform the museum space into a game board for immersive, interactive, fun and story-driven experiences that focus more on providing entertainment than creating knowledge.

As these games make use of each particular museum's assets, including its building, collections and exhibits, they can only be played in the museum for which they have been developed. They put players in an active role of puzzle-solving and light roleplaying elements, immersing them in stories inspired by the museum's history and mission. Through the use of the environment as part of storytelling, the museum space is transformed into something akin to a stage, in which the story is told through physical cues and objects as part of the challenges given to players, who physically explore the museum as part of gameplay. Meaning is created by players at the intersection between the space, objects and information given by the museum, the characteristics of visitors themselves, including their preferences, prior knowledge and experiences (Achiam et al., 2014, p. 476) and the challenges completed as part of gameplay. The fact that these games do not necessarily include a digital component means that they may not incur as large an expenditure as other gameful experiences. Moreover, they fit into a larger ecosystem of immersive theatre, escape rooms and other gameful

experiences, whose popularity has grown in recent years. Cultural institutions looking to become gameful can tap into this popularity and create their own offer of location-based gameful experiences that, while focusing on entertainment, also create a context where players can learn while immersed in an environment rich in history, culture and knowledge.

Chapter Five: A Location-Based Game Design Framework for Museums

The previous chapters of this thesis were dedicated to the theoretical and practical study and development of location-based game design strategies. These strategies focused on incorporating specific components of the museum experience into the design of games, and the effect that the resulting gameplay had on players' motivation to visit the museum and their engagement with the content found therein. This final chapter is dedicated to critically reflecting on the investigation process and a discussion of the results, followed by the formulation of the location-based game design framework for museums. In the first section, I bring the data and conclusions from the previous chapters together, analysing the design strategies, resulting gameplay and its effects as responses to this investigation's research questions and aims. The second section is comprised of the location-based game design framework for museums. The variety of approaches and possibilities for museums to incorporate location-based game design into the museum experience illustrates the fact that there is no single best way for museums to become gameful. Rather, many possibilities exist to embrace games and to give visitors the possibility to engage in gameplay. Rather than a definitive set of best practices, this framework consists of context-dependent guidelines, lessons and strategies that can be used by museum professionals and game designers to create a structure for gameplay that encourages motivation to visit and enhances engagement. The focus is on creating a context for gameplay, that is, encouraging certain actions from players that are likely to result in certain kinds of experience, in terms of how motivated they feel and how they engage with the museum content.

Discussion of Results and the Research Process

The research questions and aims formulated in the introduction to this thesis were focused on the analysis of two main outcomes: motivation, in terms of reaching new audiences and turning them into museum visitors, and in encouraging existing visitors to keep engaging with the museum on location; and engagement, that is, diversifying and enhancing the ways that visitors relate to and experience the content in museums. In the first case study, I investigated the transformation of the museum tour into a quest or treasure hunt, focusing on creating a physical journey with the aim of giving more structure to the tour, while using challenges to enhance players' perceptions and interpretation of content found in the

museum. While this is a strategy that results in limited gameplay, it is an easy method to experiment with for museums that are not well-versed in game design or do not wish to invest resources into partnerships with game developers. In the second case study, I studied how to introduce objects in a museum's collection into game worlds, either by transforming those objects into environments that can be explored and played in, or by using objects to populate existing environments. The decision to use a popular game to create these game worlds, and to build events around them, proved advantageous in leveraging that popularity to attract new audiences to the museum, making this a safe and proven strategy for museums. Finally, in the last case study, I investigated the use of the environment as a major part of the design of a game, by transforming the museum galleries into game boards, which players navigate, and in which they become part of a story and solve puzzles. The strategies developed for this case study were the most complex to implement, but potentially the most rewarding in terms of the desired outcomes. While the case studies translated into diverse game design strategies and gameplay, it is possible to identify emerging patterns and themes regarding gameplay, motivation and engagement.

Through the establishment of rules, challenges and goals, all case studies gave players a structured context in which to explore the physical space of the museum. This structure limited the possible actions of players, but offered them the possibility for interactions and meaningful choices within the limitations. As a result of this structure, the players were guided in navigating and exploring a game world that was interconnected with the physical space of the museum. The gameplay itself was designed for the specifics of the museum in which it occurred, in terms of its space, thematic focus, mission, collections, history and stories, giving all the games a location-based quality. The collection objects were integrated into gameplay, transforming them into game worlds, creating stories and puzzles around them, and using their innate evocative power to enhance the game environment. During development, the gameplay took precedence over telling a story, and so storytelling was used as a way to provide context for gameplay. Nevertheless, the stories were based on the museum, stories it has to tell, and the knowledge of its personnel. In all cases, the games attracted to the museum players who had not visited them before, and to whom museums were not necessarily of interest, but who were attracted by the possibility of playing

games in a novel environment that would also allow them to engage with friends and family in a fun way and learn something new. The games were also of interest to existing visitors as a different way to engage with content they were already familiar with, giving them a reason to come back to the museum. This engagement, by which I mean the attention to and involvement with museum content, was physical, as players navigated and explored the space of the museum and beyond; intellectual, as players were required to understand and learn about the objects in the museum's collection in order to complete challenges and solve puzzles; and social, as most players decided to play with others as part of a team.

The results also suggest potential drawbacks. The games developed as part of this investigation, while successful in creating motivation and encouraging engagement, were less effective in promoting knowledge acquisition. Learning, when observed, occurred not as a main outcome, but as a by-product of gameplay, as players learned the information they needed to advance in the game. In the case of the last case study, this was indicated by players reportedly not paying attention to objects beyond what was necessary for the game. By the players' own admission, this was described as a shortcoming. However, when asked directly about the objects after the game, players could remember the information they had learned as part of the gameplay, suggesting that learning occurred regardless of players noticing it. A focus on creating location-based games for learning is a possible future line of research in this field.

This investigation focused on games as a way to encourage players to both visit the physical space of the museum and to engage with its collection objects and content, and the results suggest that location-based gameplay has advantages in attracting visitors to museums. However, location-based game design is not necessarily the best choice for every museum to embrace games as engagement tools.⁴⁹ Not all museums have the primary goal of increasing their visitor numbers:

⁴⁹ While I analysed games developed by and played in different national museums in the United Kingdom, I did not go into detail in this thesis regarding the differences in context, visitors and resources between each museum. From my empirical observations, museums in cities that are not popular tourist destinations tend to focus on finding new audiences and encouraging return visitors more often than museums in London and other traditional tourist spots. Museums outside of London also tend to have access to fewer resources. On the other hand, those museums seem to be more flexible to engage in experimentation, perhaps as a consequence of relying on smaller and more agile teams.

for example, their physical sites may be at capacity or under redevelopment. Nevertheless, these museums may still want to cater to existing visitors with different possibilities for engagement, and location-based games can be offered alongside other activities.

The complex nature of interdisciplinary practice-led research, in particular when it includes the development of practical case studies in partnership with other institutions, necessarily translates into specific limitations in the research process. While I endeavoured to create different gameplay experiences in order to acquire a broad view of the topic, there are different avenues to explore which I did not engage with due to limited time, funding and human resources. For example, the design of categories of location-based games such as alternate reality games, live-action roleplaying games, and more complex versions of the games that were included, which are therefore excluded from the design framework. This should not be interpreted to mean that museums cannot make these types of games. For some museums, such as living history museums, for example, live-action roleplaying games may be easily achievable. My decision of which games to develop was necessarily influenced by the context of RAMM, as the setting and partner in this investigation. This decision kept the location-based game design framework realistic and applicable, but had the risk of reducing that applicability to a single museum or type of museum. This led me to supplement the development of the RAMM games with my gameplay analysis of games developed elsewhere. Nevertheless, it remains difficult to determine whether any given observation is dependent on the particular game and context. The external case studies in each chapter were chosen to illustrate the breadth of strategies and the different application of game design strategies, and used as cross-examinations to extrapolate the applicability of this framework to similar contexts. In order to do this, I investigated and considered many more games than those that are included in this thesis. My choice to focus on a limited number of experiences, rather than attempt an overview of the field, derived from the perceived usefulness of studying each experience in detail, as opposed to creating an exhaustive list. Nevertheless, due to space constraints, the analysis of existing games had to be relatively short. Future research may focus on only one strategy of location-based game design at a time.

Another limitation derives from the fact that, while I refer to the museum experience as having different components, there are a variety of ways that a visitor can experience the museum and formats that those components can take. These were addressed in each chapter, but their influence on the results was not considered as extensively as the effect of game mechanics and game design strategies. With the addition of the considerable variations in gameplay that can be found between different games, and even between different players, isolating the exact effects of gameplay on the museum experience and comparing results between case studies becomes an imprecise exercise. This limitation can be addressed in future research.

Each practical case study that I developed or collaborated to develop had strengths and weaknesses regarding the design process. The first case study, *The Great Exeter Garden Quest*, was relatively straightforward and cost-effective to design and implement insofar as it did not require the development of complex technological assets, but made use of an existing resource. However, the resulting scope and gameplay was not as ambitious or enjoyable as it might have been if I had decided to collaborate with other game creators. On the other hand, the second case study, *Minecraft at RAMM*, was a successful collaboration with professional *Minecraft* creatives, which resulted in popular gameplay events. However, the lack of engagement with the maps outside the events possibly points at shortcomings in the project's promotion. The last case study, *The Rowley Riddle*, was also a successful collaboration with escape room designers, which nevertheless could have been made more complex had we been able to run it in the museum after hours, which would have allowed us to adapt the museum more deeply to reflect the world of the game.

As for the data collection and analysis part of the research process, issues arose from small test audiences, which limited the validity of the generalisation of results. This limitation was due to time and resource constraints derived from conducting this investigation as an individual researcher, engaged in theoretical and historical research, in the development and implementation of case studies for RAMM, and the observation, documentation and interview process of the resulting gameplay. This was a consequence of my decision to adopt an interdisciplinary methodology with different perspectives beyond that of an

external researcher, including the perspective of the game player, the game designer, and the museum liaison.

Moreover, from the beginning of this investigation, I decided to engage in the design and development of several different case studies. I did this in order to acquire a broad sense of the possibilities of location-based game design and to be able to contrast and compare the different experiments. This decision had advantages from a scholarly point of view, as it offered a more complete view of the field, and from a practical point of view, as it benefitted RAMM to have more experiences and knowledge produced as part of this investigation. This was one of the requirements when engaging in this collaborative PhD process. Ultimately, the volume of research and material produced, coupled with the space limitations associated with a thesis, required me to be selective when it came to examples and case studies included in each chapter. I stand by that decision as necessary when studying an emerging field, as not doing so would risk presenting a misleading or reductive perspective. Nevertheless, that broadness precludes depth which may consolidate findings. While I defend my decision at the moment in time and in the context in which this research was developed, it would be my recommendation that future research address this issue by focusing more on the design, development and gameplay of one particular location-based game or game design strategy at a time.

The decision to engage the work of external game developers to create the games proved advantageous not just for the quality and complexity of the resulting gameplay, but also to make the development and research process more straightforward. I made the decision early on to focus on carrying out an in-depth study of the experience of fewer players, rather than attempt to reach large numbers. Nevertheless, the applicability of results would have been better with more participants. My inclusion of case studies from other museums, which I analysed as a player using the same parameters as applied to the study of other players' gameplay experiences, contributed to mitigating this limitation. I combined different perspectives, acquired through literature reviews, first-person gameplay analysis, and location-based game design, alone or in collaboration with game creators, and finally, gameplay analysis of other players' experiences, in order to increase the reliability of results and, consequently, of the game design framework formulated in the next section.

Game Design Framework

The theoretical and practical research conducted throughout this investigation resulted in a set of guidelines, processes and strategies that are organised here into a location-based game design framework tailored to museums. The structure of this framework is influenced by references from the field of game design mentioned in chapter one, including Salen and Zimmerman's rules of play framework (Salen and Zimmerman, 2003), Hunicke, LeBlanc and Zubek's MDA game design framework (Hunicke et al., 2004), Ardito et al's guidelines for the design of educational location-based games (Ardito et al., 2010) and Montola, Stenros and Waern's work on the design of pervasive games (Montola et al., 2009b). The goal of this framework is to support museum professionals and game designers in the development and implementation of location-based games and gameful experiences, and to diversify and improve the museum experience through the creation of interactive, fun, and motivating experiences for visitors. Instead of creating detailed and closed instructions on the game design process that leave no room for experimentation, these are general guidelines that aim at providing an initial structure and real-world guidance to the practice of crafting the gameplay experience for players, and which can be adapted to the specific context of each museum, with its own aims, collections, stories, resources, location, and community. In large part due to the context in which I conducted this investigation, the resulting framework is aimed at museum professionals that would like their museum to host more games, and have only begun to experiment with the format, and game designers that wish to become involved in the process. These guidelines should also be useful for those institutions that have already developed some work in location-based games, but the framework is meant to serve as a starting point which can be applied and developed into more complex methods in the future.

The game design framework is organised into three sections. The first section, aimed at everyone involved in the game design process, summarises the most important guidelines regarding the design of location-based games in museums. The second section, targeted at museum professionals, outlines the methodology, from defining the aims for the game, to creating a design document, selecting and assembling a team, developing the game according to the museum's objectives, playtesting and launching the game. The third and final

section, targeted at game designers and developers, focuses on guidelines for game design, namely the specifics of creating location-based games for museums, through the use of the environment, storytelling, game elements, and game mechanics to encourage certain outcomes from the gameplay experience. These guidelines come from the experience acquired during the case studies which I designed and helped develop, from the games that I played critically as a researcher, and from the observations that were made possible from conducting research in a museum setting and as a resident researcher with game creators.

General Guidelines for the Design of Location-Based Games in Museums

This section includes the most important design guidelines and conclusions for the creation of location-based games for museums.

The museum experience is location-based. Museums have been described as ‘knowledge made spatial’ (Parry, 2007). The museum experience involves being in a specific place, interacting with unique objects and related knowledge. It follows that any media or experience designed for a museum should take into account the specificities of its collection, space, personality, stories, meanings, and other characteristics. In other words, they cannot be placeless (Semper, 1998, p. 120). While it is in the interest of museums to create opportunities that allow remote visitors to engage with their content, the focus should be on creating experiences that require visitors to physically visit them, due to the aforementioned concern in increasing visitor numbers and encouraging different audiences to engage with the museum.

Games can be location-based in terms of theme, setting, objects, story, and topics included. The format of the gameplay can be similar in different museums, but the specifics should be adapted so that an experience is completely dependent on the museum in which it is played, and cannot be played elsewhere without significant modifications. This means that the game designer should know and understand the museum they are designing a game for, in order to discover the stories, objects and meanings that can be incorporated into the design. In practice this means, for example, creating puzzles based on specific objects and the knowledge around them, involving players in stories that are unique to the museum, and basing the choice of game mechanics on the content that can be found inside the museum space. Games can also be location-based in terms of

using the physical configuration and characteristics of the space. The physical context in which objects are displayed influences visitors' interpretations (Zellner, 2012), and the identities of museums are often tied to the building they occupy. The environment in which a game occurs communicates to the players something about the ideas, concepts, and available choices therein, as well as the significance of their actions (Nitsche, 2008). As mentioned before, in location-based games, the game world and the physical environment in which gameplay takes place overlap, so in location-based games in museums, the museum space becomes the game world. The building becomes the stage in which games are played, and the objects, exhibits, signage, implicit rules - such as no running and no touching the objects - and even the museum staff, become part of the game world.

Museums are social places. Visitors are an essential part of any museum, not only because they are at the centre of their missions, but also because, by definition, the museum experience is created with them in mind, and only exists fully when it is activated by them. Moreover, museums are social places: while solo visitors exist, most visitors attend in groups with their families, friends, among other possibilities. At all times, there are other visitors in the same space, in addition to museum personnel, so a certain degree of social interaction is expected (J. H. Falk and Dierking, 2012). These encounters can be incorporated into gameplay, acknowledged or encouraged through the use of game mechanics. For example, a game may require cooperation between players in order to solve challenges, or involve competition between teams of players. Moreover, players often organise themselves into communities around specific games, engaging in the creation of content inspired by those games, and at times even creating games themselves. With games, museums can create experiences that encourage social connections between players and inspire them to contribute to the experience with content they create. Games that foster player creativity, such as sandbox games, can be employed by museums as spaces of possibility to encourage visitors to engage creatively and productively with the museum's collection, physical space, and digital presence. Events such as game jams and game-making workshops can empower visitors with increased gaming literacy and the confidence necessary to start creating content.

Designing for social play, and the implication that these games are played among regular, non-player visitors, raises concerns regarding the use of the space and respecting the atmosphere and experience of those who are not part of the game. Games do not appeal to every visitor, or to any visitor at all times. Different games will appeal to different visitors. Games should be another possibility of engagement for museum, and not completely replace existing engagement practices. They may happen during normal visiting hours, in which case game designers need to consider how gameplay will potentially affect other visitors' experiences, and plan accordingly. Alternatively, museums may want to dedicate certain days or hours to gameplay and consider peak traffic times.

Museums have objects. The experience a museum provides is dependent on the objects that are part of its collections and exhibits. Incorporating these objects into gameplay is an essential guideline for the design of location-based games in museums. Specific ways of doing this need to take into account the fact that preserving and caring for these objects is at the core of the museum's mission, meaning that any intervention upon them has to respect their nature and physical integrity. With the appearance of digital technologies, many museums make use of tools such as QR codes, augmented reality, mobile applications, and the internet to add information around the objects in their collections (J. H. Falk and Dierking, 2012, p. 121). With games, there are different strategies that designers can employ. Objects in the collection may be recreated inside a game, or they can be incorporated into puzzles, challenges, and exploration. Objects may also be used as a mechanism for storytelling: they embody history and stories about the people, methods and the context in which they were made. Equally, they refer to their rediscovery, collection, conservation, and exhibition, all of which can be incorporated into gameplay (Goins, 2011, p. 513).

Museums tell stories. Every museum has unique stories to tell, through the architecture and the physical configuration and design of the space, through the collection and the way the objects are selected and exhibited, and the use of explanatory material in exhibits or in support materials, such as digital guides or guided tours. These stories may be about a museum's history, identity, building, collection, personnel, and community. Incorporating them into gameplay helps ensure the experience created is location-based and specific to that museum. Creating narratives which visitors can be a part of has the potential to help them

relate more closely to the museum, feel more invested in the content, and create personal meaning and memories. Digital storytelling techniques can be powerful tools to create access and engagement (Ross et al., 2014). In museums, these stories can be multimodal, transmedial – told across different media - and embodied, unfolding in potentially free-flowing temporal and physical spaces (Hanks et al., 2012). Despite changes in technology and the way that visitors interact with the museum, a focus on storytelling through objects, supported by interpretation and technology, drives the communication strategies of many museums (Wyman et al., 2011, p. 461). These stories may incorporate elements of imagination and fantasy, but the nature of museums means that they should be grounded in rigour, authenticity, and knowledge (Balloffet et al., 2014). Learning may occur while engaging with stories, if knowledge is presented as a part of the storytelling. Thinking of museums in terms of storytelling takes the focus away from the technologies that are used to do this, which become subordinate to the story (Wyman et al., 2011). The technologies used are less important than telling a story that is relevant and engaging. Games are one more tool that can be used for this.

Methodological Guidelines for Museum Professionals

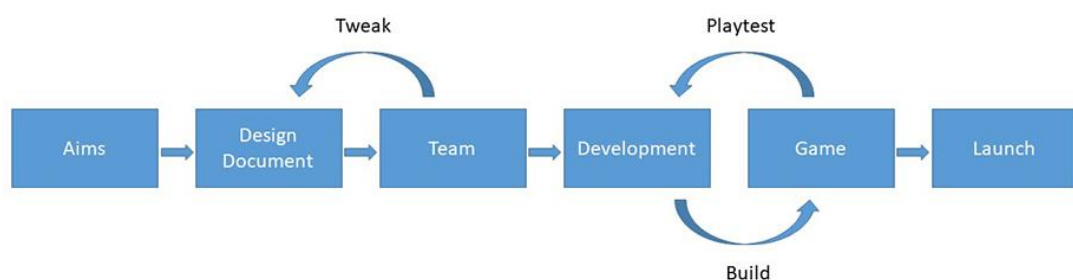


Figure 5.1. Graphical representation of the game design process for museums.

The process of designing games for museums can be divided into separate, but occasionally overlapping, steps (figure 5.1). It begins with museum professionals determining the aims and identifying the audience for the game, in order to know what the expectations are for the experience in terms of gameplay and outcomes. Next comes the creation of a game design document, which explains the desired outcomes and delineates the general boundaries and characteristics of the

experience in terms of gameplay, budget, and timeline for completion. Once they have that, they can decide on the team they need, according to the skills necessary to achieve the proposed experience, and identify partners or in-house contributors for that team. Once the team is assembled, the game begins to be developed. Once a working prototype has been built, it can be playtested and tweaked in an iterative process, until it is deemed ready to be launched. The sections that follow go into more detail regarding guidelines for each part of the process.

Defining the Aims for the Game

Define the desired aims and outcomes for the game. The first step in the game design process is to identify the aim, or goals, of the resulting experience. The overarching goal of the experiences developed during this investigation was to increase visitors' motivation to engage, and diversify and enhance the engagement between them and the museum, in order to encourage and improve the processes of interpretation and meaning-making. The creation of fun and entertaining museum experiences is an aim in its own right. Learning was considered an advantage, and not the main focus for these games. Knowledge acquisition may be the priority for some museum professionals, in which case this should be defined and communicated to the team from the beginning. Other qualitative outcomes can be more specific to each museum and the context in which the game will be played, such as promoting a specific exhibition or collection. Quantitative outcomes can include, for example, an increase in the number of visitors to the museum's physical space, an increase in the number of people who access the museum remotely, reaching new segments of the community who are interested in games, or encouraging visitors to contribute with content using the museum's digital and social media platforms.

Define what is unique to the museum. Museum professionals should start by looking at their institution's mission, collections, community and scope to determine what is unique about their museum, and incorporate those unique characteristics into the game to increase their visibility. For example, a museum whose collection focuses on a specific region or city may wish to deepen their community's engagement with their historical roots, or a museum which specialises in a certain area, such as sculpture or rural life, may wish to create a game that immerses players into those activities and areas of knowledge.

Museums may also wish to highlight certain objects in their collections, or to direct players' attention to the building's architecture or overlooked areas of the galleries. The aim is to enhance the location-based quality of the games by highlighting what is unique to that institution, which in turn signals to players that the game is an experience they cannot have anywhere else.

Define the target audience for the game. Determining the audience group or groups for the game, as well as how players interact with one another during gameplay, will impact the design and development process. Creating a game for children or families to play requires different considerations from creating one directed at adults. While games tend to be associated with children and teens, adults also enjoy engaging in gameplay, as shown by the statistics on gamers and game playing mentioned in chapter one (ESA, 2016), and as demonstrated throughout the case studies for this investigation, some of which, such as *The Great Exeter Garden Quest* and *The Rowley Riddle*, were targeted at adults. Once the intended audience is decided upon, museum professionals should work with game developers to consider that group's characteristics, possible interests, skills, and preferences, which will influence the game decisions on the difficulty of challenges and types of engagement.

Creating a Game Design Document

A game design document is a descriptive file created to organise the development process and to make sure that everyone in the team is kept on the same page regarding the plans for the game. While there is no standard on what should be included, this document usually contains the concept and theme of the game, the technology used to play it, what the desired gameplay looks like, choices regarding game design, the project's budget and timeline, and other information pertinent to the process. It is not designed to be a static document, and it should be adapted as the project progresses to reflect changes in the development, insights and feedback from the museum and game development teams. While it should be created early on by the museum team, in order to be sent to potential game developers, once the team has been assembled, the game developers can add to this design document during the development process, following the contents included in the second section of this framework.

Decide the game's concept and what the desired gameplay will be like.

Following the aims for the game, the museum team decides the concept and theme of the game as well as its general format, from an action-driven quest, to a roleplaying game with an immersive story, to a competitive multiplayer challenge, an alternate reality game, and everything in between. Once the team includes game developers, they bring their expertise regarding what works in terms of gameplay, motivation and fun, while museum professionals know what their institution's strengths are, what their community wants, what their ethos and mission is, and connect that to the aims of the game. This is the time to consider and communicate any requirements regarding how the museum space and content can be used, including whether the game will be played during opening hours or during special events, if there are any out of bounds galleries or objects, how many players will be able to take part concurrently, and if it is possible to enlist the assistance of volunteers or museum staff.

Select game elements and mechanics for inclusion and exclusion. This section is populated by the game development team, following the guidelines included in the next section of this framework, but museum professionals can also choose to include or exclude certain game elements and mechanics according to the aims of the project. It should be noted that the same game elements and mechanics can have different outcomes depending on the context in which they are applied and on the preferences of players. For example, competition between players can be considered problematic for certain games or audience groups, and necessary for others.

Consider matters of budget and timeline. Due to the iterative process of game design and the unpredictable nature of gameplay, the budget should establish clear boundaries but allow flexibility so that resources can be directed towards where they are needed. Allow time for museum professionals to support the game developers with consultation on the museum's collection, stories and knowledge, for playtesting sessions, and for incorporating feedback and changes. The budget should also include publicity efforts, as well as take into account the possibility of organising events for launching and promoting the game.

Include information on the objects, galleries and knowledge to be incorporated into the game. Add to the design document photographs, links, stories, and other information regarding the museum content to be included and

other potential inspirations. Supplement the information by scheduling time with the game developers to go over those objects, galleries and information on location with the museum staff.

Assembling a Team

Decide which members of the museum staff to include in the process. This can include board members, staff from the curatorial and collections departments and from, depending on the museum, the digital engagement, social media, marketing, the front of house team and events departments, whose members may be involved at different stages in the process. Understand what their own aims are for the project and how they can contribute to and support the game, in terms of time, knowledge and resources.

Determine what additional skills are needed. This will help decide if the game development process can be kept in-house, which may be the case with simple projects, or if you need to partner with game developers. It will inform what skills to look for in external collaborators. A game development team working on an escape room requires a different configuration and skill sets from one working on a mobile game. This will also influence the type of partnership established with external collaborators. Examples of the configurations a game development team can have, and how museums can approach external collaborators, may include: establishing a commercial relationship, in which the museum invites proposals from game developers, or approaches specific collaborators with a commission; and collaborating with educational institutions to involve budding game developers in the process, in which case the focus shifts from creating a product to establishing a creative partnership. Entering a research and development partnership with universities and industry partners is an option which decreases the burden on the museum's resources, while allowing for experimentation with cutting-edge concepts and technologies.

Developing the Game

Schedule regular meetings with the entire team. If external game developers are involved, the process of building the game will most likely happen outside the museum. It is important to keep an open line of communication between the museum team and the game developers, checking in regularly to see how the development is progressing. This allows the museum team to ensure the process

is on time, the resulting game is in line with the aims of the project, and to support the game developers throughout.

Documenting and communicating the building process. The game development team should, as much as possible, document the building process and share the documentation with the museum team. This can take the form of screenshots, gameplay videos, written or face-to-face reports, among other possibilities.

Playtesting the Game

Once a working prototype of the game has been created, the next step is to playtest, gather feedback, analyse, introduce the resulting changes, and playtest again. This iterative process can start once a bare bones prototype of the game is created, and continues as the game development process progresses. Initial playtesting can be done in-house, by members of the team, and later extend to players who are representative of the target audience. Building upon that feedback and observations, the experience is tweaked and improved, until the game is deemed to be ready to be launched. The importance of playtesting stems from the fact that, as mentioned elsewhere in this thesis, game designers can only create the system that supports and gives rise to gameplay, which in practice may not correspond to what players decide to do during the game. During playtesting sessions, the museum and game development teams can observe how players interpret the rules and engage in gameplay, and analyse the various game design choices, including, but not limited to, how difficult challenges are, how fun and engaging the experience is, and how interesting and involving the story is. Playtesting is particularly important in location-based games, as it uncovers concerns that may only arise from playing on location and which need to be taken into account, such as accessibility issues, footfall from non-playing members of the public, lighting and environmental conditions, and crowding of players in specific spaces. This dynamic and iterative process ensures that the audience's experience is at the centre of all decisions throughout the design and development process. Once the game has been playtested and tweaked into a version that everyone in the team is happy with, it is ready for release to the public.

Launching the Game

Promote the game. Promoting the game is essential to assuring it reaches the target audience. Release should be scheduled around publicity efforts in order to create interest, promote the museum and increase the project's visibility. These promotional efforts will depend on the game and its target audience, and may include inviting members of the press to play, engaging schools and other educational institutions and marketing, among other possibilities.

Consider organising a launch event. Depending on the type of game created, location-based games may be played at set times in the museum, as was the case of *The Rowley Riddle*, or they may be available to be accessed and played at any time, as *The Great Exeter Garden Quest* exemplifies. In some cases, such as the *Minecraft at RAMM* project, parts of the game may be accessible at any time, with specific gameplay events organised at set times. In all cases, a launch event is an optional but useful way to increase the project's visibility.

Review, analyse and evaluate. Finally, as with any other tool used for engagement, communication and interpretation, it is useful to document and analyse the experience, evaluate its success in terms of outcomes, and reflect on the working process. The process through which evaluation should be done will, once again, depend on the format of the experience. Moreover, it is possible to continue improving the game after it has launched. The emergent nature of gameplay means that some issues or opportunities only become apparent once the game has been played extensively by a variety of players.

Regarding the Game Design Team

Directed at museum professionals, these guidelines outline the steps in location-based game design, the choice of who to involve in the process, the decisions and input expected from the museum team, pointers on how to support and guide the game development team, and what to expect from the process. Game design is a collaborative process, and while it is possible to keep the process in-house, it is unlikely that most museums will have game design skillsets available, so involving external collaborators becomes necessary. The museum team may involve staff from different departments. While curators can and should be involved in this process, insofar as the resulting experiences incorporate the collections, galleries, and knowledge accrued by the museum, this process is not

solely the curators' responsibility. Nor is it the responsibility of museum educators, of the audience development or events staff. Instead, I propose that this process should be looked at as transversal to the museum as an institution. Where present, the creation of these experiences can be considered part of Digital Engagement, itself a transversal department which has appeared in recent years in response to the growth of the internet and other digital technologies, and which has gained importance following the increasingly widespread use of social media and mobile devices. Regardless of the existence of such a department, this design framework implies the involvement of external partners who can contribute with expertise and resources that would be difficult for museums to have in-house.

Game Design Guidelines

This section of the game design framework is aimed at game designers and developers who wish to become involved in the creation of location-based games for museums. Rather than a guide to game design, it is a set of guidelines that can be followed to ensure that the decisions made during the game design process, regarding game elements, mechanics, storytelling, and other topics, are kept in line with the aims of the museum and the desired outcomes for the project. In summary, these are guidelines on how to apply pre-existing game design knowledge to the museum space. The topics covered in these guidelines include devising a structure for the game, selecting game elements and mechanics, the use of narrative and storytelling, incorporating the museum's environment as a game board, and designing for museum audiences. These are general guidelines that can be adapted to the design and development of different types of location-based games. As stated in the previous section of this chapter, these decisions should be added to the game design document during the development for clarity of communication between members of the team.

Design games that add structure and purpose to the museum experience.

One of the findings from this investigation is that the addition of a game structure to the museum experience contributes to creating motivation to visit, and gives players a purpose when engaging with the museum's content. This structure is achieved through the establishment of rules, goals, interactions and mechanics for players to follow as they play the game, which takes players on a structured journey through the museum and directs their attention towards their

surroundings. Establishing the limits of the experience with clear start and end points contributes to creating a sense of closure, prevents players from feeling lost, and ensures that the pacing can be somewhat controlled by the game creators. While this may leave players feeling rushed in their experience of the museum, time limits can be used to create a sense of urgency and to encourage players to go back to the museum after the game.

Leave space for agency and emergent gameplay. It is important to leave the players space for emergent actions and decisions. A game structure restricts the possible actions and movements of players to those encouraged by the game system, over which the game designers have a degree of control. While this control is necessary and desirable in the structure it offers to players, restricting them too much may result in a complete loss of autonomy. Players can be given freedom, within the boundaries of the game, by letting them decide where to go, the order in which to do certain actions, how to interact with and interpret the content in the museum, and the strategies to solve challenges, among other possibilities.

Select a game mechanic that responds to the desired outcomes for the game. Depending on the desired outcomes for the game and the specific characteristics of the museum, game designers can select a combination of game mechanics to encourage certain actions from players. For example, to encourage players to visit overlooked areas of the museum, make spatial exploration, movement and navigation part of the gameplay; facilitate players' learning about the objects by asking them to analyse them and find information as part of puzzle-solving; use roleplaying and storytelling to make players feel personally invested in the story and topic, and to create personal connections and memories as part of gameplay; encourage them to relate to other members in their social groups by asking them to collaborate in solving challenges; and engage their creativity by asking them to build something as part of the game, among other possibilities. Most games will use a combination of several game mechanics to enhance the museum experience and achieve the outcomes devised by the museum. The playtesting part of the process helps determine the results of the choices and allows game creators to keep tweaking the experience until they deem it successful.

Design gameplay for motivation to engage and to keep playing. Game designers should create motivation by focusing on creativity, interpretation, and engagement, and on the players' agency, skills and social groups, rather than on external rewards. According to the self-determination theory, motivation occurs when feelings of autonomy, competence and relatedness are achieved during gameplay (Ryan and Deci, 2000). In a game, autonomy starts from the moment when players choose to engage in play, and continues as long as the game gives them agency to choose what to do within the constraints of the system's rules and goals. Relatedness is integrated into games with social play through the creation of interactions based on cooperation or competition. Feelings of competence occur when players understand a challenge, and believe that they have, or can readily acquire, the relevant skills to overcome that challenge. As a game design rule that can be applied inside and outside museums, game designers can encourage this by offering players challenges with different levels of difficulty, and which require different skills to solve. The game system gives them instant feedback on the effect their choices and behaviours have, immediately letting them know how effective they are, and what they can change in order to become more proficient. Minimise the creation of challenges that cannot be failed or that can be won arbitrarily, as this impacts the feeling of competence negatively.

Design gameplay for engagement with the museum content. Game designers should be aware that games, even if they are played on location, may distract players from their surroundings, particularly if they are played through digital screens, unless their attention is directed. The aim should be to design games that incorporate the museum environment and implicate the objects in gameplay as part of challenges and puzzles, encouraging players to look at them and experience them in ways that make sense within the game world. The actions the games ask players to do should make sense within both the game world and the museum environment. Behaviours that visitors already engage in museums, and which can be adopted as part of the gameplay, include taking photographs, sending messages, finding and analysing objects, studying the architecture, engaging with their group, other visitors or the museum staff, and exploring the space.

Choose technologies that respond to the desired outcomes, and that visitors are already familiar with. The decision of which technologies to use to create and play the game depend on the desired gameplay and outcomes, the characteristics of the museum space, and the budget and resources available. Some location-based games, such as escape rooms, do not require digital technologies, while others rely heavily on the use of dedicated technologies such as Bluetooth, GPS, wireless networks, and cameras. A game may require, for example, monitoring of the players' movements, to enable location-specific activities, using sensors to dynamically respond to players' actions, sending messages or capturing video, or using screens and projections to overlay digital information onto physical spaces. Custom-made technologies are assured to match the needs of the game, but are more expensive and time-consuming to build. Adapting existing technologies results in savings, but means adapting the game design to the limitations of the technologies. When deciding which technologies to use, game designers should prioritise using devices that visitors are already familiar with, to reduce the time necessary to learn to play the game. Existing games and gaming platforms can also be adapted, particularly if they are known to be popular with the target group (as *Minecraft* is with children).

Stories are important for museums. Through roleplay, games can make visitors an active part of those stories. Human beings are natural storytellers, making sense of the world through narrative (Hanks et al., 2012, p. xxii). Stories are used by museums to foster personal connections between players and museum content (Bedford, 2001) and to introduce a human-scale perspective on events and experiences (Fraser and Coulson, 2012). As a storytelling medium, games make players an active part of the story, with agency and responsibility, this supports individual interpretation and making of memories (Nielsen, 2017). Communicating information and contextualising objects through stories makes the museum experience more interesting and memorable, and adding games to that practice makes it entertaining, interactive, and purposeful. Giving players a role to play, which can go from a simple title that describes their actions in the game to a complex new persona, allows them to understand their place in the story, gives them an initial prompt and directions on how to proceed, and encourages them to feel invested in the narrative. Stories can introduce a subjective point of view through characters, events and the use of narration, and

incorporate the information accessible in the museum and the knowledge of its staff into the story. Fiction and fantasy can also be used, but should be checked with the museum team to make sure that the resulting story respects the aims for the project and the museum's ethos.

Balance collaboration and competition. Collaboration with other players is generally appropriate in a museum setting, and encourages feeling of relatedness, which contributes to creating motivation. Competition with other players should be used more carefully and discussed with the museum team. When designing collaborative play, game designers should consider how the collaboration may take place. Different players have different skills, and a successful team employs the different skills of its members in order to collaboratively solve challenges.

Consider the social environment of the museum. As previously stated, visiting a museum tends to be a social experience. Although single players will also exist, game designers can take advantage of the social nature of museum visits by incorporating it into gameplay. Design considerations when creating games for museums include the number of players who participate in the game, the number of concurrent teams, the impact they will have on the museum environment and the impact they will have on non-playing visitors. Having volunteers or a game crew present in the space can minimise potential risks of disrupting the normal functioning of the museum. As an alternative, consider organising dedicated gaming events with playtests, gameplay, and workshops.

Encourage players to explore and navigate the museum space. In location-based games, players tend to be mobile, and as they explore the museum's space, they find new galleries, interact with their surroundings, and interpret the objects. Exploration is a game mechanic that creates engagement based on the curiosity of players, a desire to discover what is beyond known boundaries, following directions and deciding where to go. When designing navigational possibilities, game designers should consider the characteristics of the environment, such as galleries that have very few visitors, or that are too popular; if the space implies a linear navigation through the galleries, or if it is more labyrinthine; possible 'choke points' that impede the flow of visitors; how easy it is to find a certain case or object; possible environmental cues and other characteristics that will impact the signposting and pathway of players.

Use the museum's space to help tell the game's story. Using the museum space to tell a story is a technique already used by curatorial teams, who establish an exhibition's narrative as the stories and ideas that the gallery space communicates (MacLeod et al., 2015, p. 324). In location-based games the environment can be used to tell the story by helping to create a setting, by referring to the architecture and objects, and by immersing players into a pre-existing ambiance. It is possible to request temporary interventions, such as adding props to the space, but as much as possible, game designers should work with what is already in the space. In a sense, the museum space becomes a stage, as well as a game board.

In Summary

The purpose of this chapter was to bring together the findings, conclusions and experiences acquired during this investigation and communicate them in a format that is useful and productive for museum professionals and game designers who wish to create location-based games that enhance the museum experience. The resulting location-based game design framework includes both a general process and practical guidelines that can be adapted by different museums. The exact configurations of the resultant games are dependent on the characteristics of each museum, the environment in which the game will be played, the museum's expectations for the game, the skills of the people involved in its creation, the decisions made during the process, and, ultimately, the way that players decide to interact with the game, which cannot be directly designed, but can be encouraged. The case studies developed during the course of this investigation represent the first steps towards creating a comprehensive guide to how museums can become gameful, that is, how they can devise strategies to make the visitor experience gameful in different ways.

My goal for this game design framework is for it to be applied and further developed by other game designers and museum professionals in a multitude of contexts. Since finishing this investigation, I have applied these guidelines in my own professional practice developing location-based games for museums, explaining and demonstrating the process to the museum professionals

involved.⁵⁰ In the future, my aim is to undertake this demonstration in a more structured and formal way, through the delivery of workshops, talks and other outreach strategies.

In the following chapter, which is the conclusion to this thesis, I summarise my contributions to the fields of game studies and museum studies, considering how the restructuring of the museum experience into a game may signal the development of a gameful museum, before ending with final remarks and directions for future research.

⁵⁰ Examples of games I have worked on with Fire Hazard Games include *Raiders of the Lost Archive: A Christmas Quarrel* at the V&A Museum of Childhood and *Raiders of the Lost Archive: The Extraordinary Voyage* at the National Maritime Museum.

Conclusion

Over the course of this thesis, I have argued that designing location-based games to be played in a museum context, through the act of re-structuring the visitors' experience so that it becomes part of gameplay, is beneficial to museums. These benefits consist in attracting new and existing audiences, creating motivation to visit and to engage, and enhancing visitors' engagement with the museum content by making that engagement more directed and purposeful. In order to understand how this happens, throughout this practice-led investigation, I have developed a theoretical and practical study of location-based game design and gameplay as part of the museum experience. I have demonstrated that games which incorporate the museum space and the experience visitors can have therein into their design motivate two main groups of players to visit the museum: those that have never visited before and feel attracted to the possibility of playing games in a new environment, and existing visitors who require new content or new ways of engagement in order to come back to the museum. In terms of improving engagement with the museum, this research demonstrates that location-based games focus the attention of players and direct the ways they engage with the space and content in the museum. Creating location-based experiences means that the space, galleries, collection objects, stories and knowledge available in museums are integrated by the design team into gameplay in ways that make sense within the game world. Examples of ways that museum professionals and game designers can do this were analysed and put into practice throughout this thesis. Games become the catalyst which guides the attention of visitors towards the museum content in specific ways, reframing the visitors' engagement as part of gameplay.

In order to advance the knowledge and practice in the topic of game design for museums, I have developed a location-based game design framework with guidelines for museum professionals and game designers who wish to engage in this practice. Throughout my research, it has become apparent that game design practices and the resulting gameplay experiences are highly dependent on the museum and collection for which the games are developed, reflecting the practice's location-based nature. While it is also clear that different game mechanics result in different types of experiences for players, it is possible to discern general patterns of engagement. By re-structuring the museum visit as a

game with rules, challenges, interactions and goals, while still allowing for agency and meaningful choices, players have a more guided and focused museum experience. In order to advance the game, they interact with and learn about the museum content, navigating and exploring the space, acquiring new knowledge, using their skills, while collaborating or competing with other players. Players may become part of a story that can only be told in a particular museum, solve puzzles, engage in challenges, and creatively contribute with their own content. However, while players did acquire knowledge as a by-product of gameplay, results suggest that location-based games are not necessarily conducive to learning, which is a priority for many museums. Whether this indicates that location-based games are more adequate to encourage motivation and engagement, rather than learning, or that these results would be different if the games were built with the aim to foster knowledge acquisition, remains an open question that can be addressed in future work.

From the beginning of the research project, I have argued that, in order to analyse and understand the experience and practice of location-based game design in museums, new methodological approaches were necessary to ensure that the interdisciplinary nature of the practice and experience were respected. To this end, I engaged in a practice-led investigation which resulted in the development of a location-based game design framework with potential for wide applicability by museum professionals and game designers. The methodological approaches used in this investigation are built upon experience and practice, in the form of first-person and external examination of the gameplay experience, as well as the analysis and documentation of the game design process and the resulting experiences. These approaches are informed by theory, emerging practices and guidelines regarding pervasive games, other types of museum games and ways of engagement. The first chapter of this thesis was dedicated to identifying and establishing the concepts, terms and practices from game studies and museum studies which informed the rest of the investigation. Chapters two to four were dedicated to the development and study of experiences which illustrated different approaches to location-based game design in museums, resulting in data and conclusions on the relationship between game design, gameplay and the museum experience. Chapter five represents the culmination of this theoretical and practical study, in the form of a design framework that can be adapted by

museum professionals and game designers in order to improve their own practices and advance the field.

This investigation shows how, through the analysis of the museum experience during gameplay, combined with the development and analysis of the game design process, it is possible to discern connections between game mechanics, game design strategies, player behaviours and types of engagement with the museum content. The different case studies demonstrate that the possibilities for location-based gameplay in museums are extensive, and result in different types of engagement. As explained in the previous chapter, these experiments are by no means exhaustive, representing an initial step towards the understanding and establishment of the practice of designing better location-based games that improve the museum experience for visitors. Ultimately, this thesis points the way towards future practices and helps direct the establishment of museums as a productive context for location-based gameplay.

This thesis represents a timely documentation and analysis of the emerging practice of location-based games in museums. I identified a gap in scholarly discussions about games in museums, which was a lack of focus on creating location-based gameplay, from the perspective of the design and development process and the resulting museum experience. Those who wished to engage in this practice could only learn from scattered reports, compilations of case studies that included different types of games and play for museums (Beale, 2011), and studies on pervasive games, the conclusions of which were not always applicable to the context of museums (Montola et al., 2009b). In order to address this gap, I developed an interdisciplinary methodology that allowed me to study the topic from various perspectives, which included viewpoints and experiences from the museum staff, the game designers, and the players, as well as my critical engagement with those roles. Ultimately, this thesis represents a contribution to game studies and museum studies through the development, documentation and analysis of gameplay and game design processes, and the creation of a design framework that can be adapted by museum professionals and game designers who wish to engage in these processes.

Contributions to Game Studies and Game Design

The broader implications of this research to the field of game studies can be found in its contributions to the practice of game design. As stated in chapter one, in recent years, it is possible to identify the spread of game mechanics and gameful experiences to contexts not previously associated with games. Moreover, pervasive games have become more common and are now the focus of considerable scholarly work. I believe this spread of games into different contexts, to which their gameplay is responsive, building connections between a virtual game layer and different physical spaces, is a fruitful possibility for the future of game design. One of the differences between my research and what has been done before is that it focuses on the museum as a space and context for location-based gameplay, with its own characteristics, environment, objectives, stories and meanings.

In this thesis, I have presented museums as a productive context for location-based gameplay, contributing to knowledge in game studies, specifically in the design of pervasive games, by conducting an in-depth study of a particular context for that practice, and creating a set of guidelines that game designers can follow to develop new work in that context, in collaboration with museum professionals. This framework is intended to be an accessible tool with real-world applicability, aiming to encourage, support and guide future practices and experimentations in the field, as well as suggest new directions for research. It signals a possibility for future expansions and developments in the field of location-based game design practices, namely, to focus research and experimentation on the contexts for gameplay in terms of space, history, meanings and content of that space. Theorists and practitioners of game design can discuss how the game design process and gameplay change according to the specific context in which the game will be played, and how to incorporate location-based characteristics into gameplay, while respecting the nature and aims of those spaces. Some work has been done in the development of pervasive and location-based games for urban spaces and educational institutions, but in relation to museums, it is mostly comprised of individual game reports, which I will address in the section on the contributions of this investigation to museum studies.

As mentioned in chapter one, the practices of gamification and gameful design have resulted in the re-structuring of different types of experiences into games, some of them location-based. While scholarship on the subject is extensive, one of the major works that looks into the consequences of this phenomenon is *The Gameful World*, edited by Steffen P. Walz and Sebastian Deterding (Walz and Deterding, 2014). Most of the analyses included in the book focus on the aims of the gameful experiences, from learning, to health and wellness, to marketing, task management, and others, but those aims are not necessarily connected to the context in which they are played. Exceptions include urban spaces and educational institutions.

Game designer Kars Alfrink describes a gameful city as one in which players are empowered to appropriate, re-interpret and add new meaning to urban spaces, through engagement in gameplay that is highly contingent both to the space where it is located and to the unique characteristics of players (Alfrink, 2014). His essay focuses on the physical form and function of the city, that is, the ways in which its inhabitants engage with it in their daily lives, and considers how those characteristics can be incorporated into gameplay (ibid). Namely, he believes that gameful design allows players to shape urban environments for play through approaches such as appropriation, defamiliarization, socialization, subversion and formation (Alfrink, 2014, p. 529), and shows real-world examples in which different game mechanics were used for that purpose. Cities are analysed as spaces for gameplay elsewhere, with a focus on pervasive games and how game designers can think of space as media (H. Davies, 2007; H. Davies and Innocent, 2017). As for educational institutions, game designer Katie Salen's analysis of the *Quest to Learn* schools (Salen, 2014), which re-structure curricula and school life into games, represents a focus of game design for learning in schools using one institution as the main example (see also Salen et al., 2011 for specific guidelines regarding this re-structure). These approaches represent similar efforts to the work I developed in this thesis, applied to different contexts, solidifying the view that this is a possibility for future work in the field of game design.

While engaging in game design, I kept in mind various game design frameworks, including Salen and Zimmerman's rules of play framework (Salen and Zimmerman, 2003), and Hunicke, LeBlanc and Zubek's MDA game design

framework (Hunicke et al., 2004). However, while these frameworks are useful in terms of defining the language to be used regarding game elements and mechanics, they are more geared towards the creation of videogames. Montola, Stenros and Waern's work on the design of pervasive games (Montola et al., 2009b) represents the groundwork upon which my work on game design was based. Similar to *The Gameful World*, their work provides guidelines for the design of pervasive games, covering topics such as designing for social, temporal and spatial expansion, which represent the specific guidelines for pervasive game design, and includes case studies to provide real-world examples of the application of those guidelines. As mentioned before, this thesis and its framework represent an expansion of the guidelines that can be found in their work. While location-based games are mentioned in the book, referred to as site-specific games (Montola, Stenros, and Waern, 2009a, p. 80), not all pervasive games are location-based, and location-based game design guidelines require an understanding of the context which the game is developed for. The work developed in this thesis therefore represents a contribution to existing work as it is more specific and tailored to a particular location, suggesting other lines of enquiry for future work in which location-based game design frameworks and theories can be revised and expanded.

Contributions to Museum Studies

The contribution of this investigation to the field of museum studies starts with the location-based game design framework formulated in chapter five, which is intended to give museum professionals tools and guidelines to collaborate with game designers in the creation of engaging experiences. While embedded in the context of a museum, pursuing a collaborative PhD that was created to include both theory and practice, I became increasingly aware of the institutional need for academic work with real-world applicability regarding the design of location-based games. Additional contributions to the field lie in the in-depth study of an emerging tool for museum engagement, creating a documentation of current practices and consolidating knowledge regarding their design and the effect of the resulting experiences in creating motivation and encouraging engagement from visitors.

In comparison to existing models of engagement, location-based games add to the museum experience a structure that is based on a system of rules, challenges

and goals, and which can also incorporate a story, roleplay, exploration, and various other elements and mechanics. Interactive and immersive museums, such as science centres and children's museums, have existed since the 1960s and 1970s, while other institutions, including heritage and media museums, have been transformed to become increasingly interactive and participatory. The difference between this model of engagement and location-based games as engagement is on the type of interactions afforded and the way they are framed. The interactions and behaviours that players engage in while experiencing the museum as part of gameplay may be the same as in other activities and forms of engagement, but in a game, those actions are framed and gain significance as part of a game world, as players are given agency and meaningful choices within the limits of the rules. Crucially, the popularity of games means that their presence in museums may attract new audiences who regularly play games, but do not necessarily visit museums. My work represents a contribution to an existing body of work in museum studies regarding engagement techniques that are social, participatory, immersive, and multimedia, by adding gameplay to those characteristics. In this section, I go into more detail on how my work compares to and builds upon existing work in the field of museum studies.

In her influential work on participatory techniques for museum engagement, Nina Simon calls for the development of institutions that are open to their communities as participants who 'create, share, and connect with each other around [museum] content' (Simon, 2010, p. ii), using real-world examples to demonstrate how museum professionals can make their museums more participatory. Comparing the guidelines Simon establishes for the creation of a participatory museum to the game design framework in this thesis, it is notable that many of the aims for and reasons behind participatory techniques for engagement are the same as for using location-based games, with games of all types being mentioned in her book as examples of participatory engagement. She states that the use of participatory techniques is an addition to the existing engagement design toolkit of museums, not a replacement for all other strategies. I argue that the same is true for location-based game design for museums. The nature of gameplay implies that location-based games are necessarily participatory. This thesis builds upon the concept of the participatory museum to analyse a specific tool for participatory engagement in museums. Designing location-based games for museums can be

seen as taking these participatory techniques one step further by using game structures to focus and frame that participation.

The need for increased responsiveness to their communities from museums, thinking of the museum experience from the point of view of visitors, and with the realisation that all museum professionals should consider how to communicate and interact with the public in ways that support their meaning-making, has been addressed before (J. H. Falk and Dierking, 2000, 2012; Lang, Reeve, and Woollard, 2006). Strategies to deal with these challenges include the use of different media and technologies to create new models of engagement. Ross Parry has written on the influence of digital media in museums, editing a group of essays with reflections on how digital technologies have been used in collection management, curatorial practices, interpretation and engagement (Parry, 2010). Of particular interest to this thesis is how digital technologies have changed the museum visit, through the addition of a virtual layer, mobile phones, the internet and social media, which can also be used in location-based games. Graham Black argues that, in order to remain relevant for twenty-first century audiences, museums must transform their engagement practices to accommodate new media and the subsequent societal shifts, by providing enjoyable and stimulating social experiences which engage visitors as active participants and contributors (Black, 2012, p. 10). The same author had previously published a study and set of guidelines for museums to examine and re-structure every stage of the visitors' experience in order to create motivation to visit and to stimulate on-site engagement (Black, 2005). Peter Samis and Mimi Michaelson defend a visitor-centred approach to museums, which puts collections, exhibitions and visitor engagement on the same level of importance, and present a set of guidelines and approaches, including encouraging physical, cognitive and emotive engagement, creating immersive experiences, with games used among the examples, based on the study of several case studies (Samis and Michaelson, 2016). These works highlight the need for museums to consider their audience's preferences and to keep innovating in their engagement practices, in order to face a changing technological and social landscape and remain relevant in the future.

Finally, this thesis builds upon *Museums at Play*, which remains the most comprehensive survey of games in museums, edited as a group of case studies

presented by game developers and museum professionals (Beale, 2011). Commonalities with my research include the interdisciplinarity of the work, the focus on real-world examples of design and development, and the understanding that games are increasingly being used by museums as audience development and engagement tools, so it is useful to document the process and share best practices. Several of the case studies included are location-based games, some of which, such as *Art Heist* (2010), are also referenced in this thesis as well as a case study in the book (Mees, 2011).

As several types of games and play experiences are included in the book, comparatively, this thesis is more focused on one category of games. Maintaining a focus on the location-based quality of gameplay leads to unique challenges, game design strategies, and effects on the museum experience, which were addressed in this thesis. My research builds upon this knowledge by positioning location-based games as an option for engagement that allows museums to adopt new technologies, experiment with different models of engagement, and diversify their engagement toolbox to include all kinds of experiences. Ultimately, the reasons behind building museums that are increasingly participatory, responsive and multimedia, with different digital engagement practices, are the same as developing location-based games and making the museum more gameful. The difference is in how the activities and interactions are framed, in the level of agency given to participants in steering the activity or story, in the interactions with the content created in the form of challenges, and in the types of audiences that are attracted to the museum solely because of the types of engagement on offer.

Moving Forward: The Gameful Museum

Reflecting on the future of the design of location-based games for museums, I propose the gameful museum as a model of engagement that describes what museums may become in the future, as they increasingly incorporate games into the visitors' experience. Throughout this investigation, I aimed to identify possibilities for creating a gameful museum through the incorporation of gameplay into the museum experience, the development and analysis of different game design strategies, and by understanding the effects that the resulting gameplay has on visitors' engagement and motivation. In a speculative exercise of envisioning future possibilities for museum engagement, the gameful museum

can be described as an institution that is participatory, multimedia, immersive, interactive, experiential and entertaining, which gives visitors structured experiences with rules, goals, challenges, and possibilities for social interactions through gameplay.

In a gameful museum, every part of the visitors' experience is incorporated into a game layer that can be accessed by players, if they wish to do so. A gameful museum is not dependent on museums developing location-based games, but that characteristic guarantees that the physical space of the museum is invested with layers of gameful experiences that reframe that space into a game board. Importantly, these layers can then be accessed by those who wish to play, and ignored by those who do not. For visitors to become players, they have to accept the museum's invitation to play, by downloading an application, accessing a game through a smartphone or tablet, interacting with players or staff, or through other interfaces with the game world. This game world can exist as a layer that shares and augments the physical space of the museum, but does not overtake it. Following the same way of thinking as other models of museum engagement, such as the aforementioned participatory museum (Simon, 2010), and considering the phenomenon of the ludification of culture which I explored in chapter one, I see the gameful museum as a possible next step for institutions that have already embraced participatory and digital practices for engagement.

Directions for Future Research on Location-Based Games in Museums

In the last chapter, while critically looking at the research project which culminated in this thesis, I acknowledged the need to take this investigation further by conducting interviews and gameplay assessment with a higher number of players, to reflect a more diverse set of perspectives and experiences. During this investigation, I also identified possible lines of research that I did not follow, and which represent directions for future investigations and subsequent contributions to the field.

A possibility for research that would be useful to understand the practice more fully would be to conduct a similar investigation in different contexts. As the context for this investigation was the United Kingdom, the question remains of how different the experiences would be if they were designed for contexts in which museums are not public and free, or where audiences have different

cultural reactions to museums and games. Would the game design framework still be applicable to those contexts? The most likely answer is yes, as the location-based nature of the practice and gameplay means that the environment and context which the game is designed for changes the design process and gameplay experience in fundamental ways. Discovering how this changes and why, as well as adapting the game design framework to reflect those differences, represents another possible line of enquiry.

Another possibility for future research is to focus the investigation on the effects of location-based games in knowledge acquisition. As mentioned before, this thesis focused on the development of games that created motivation and encouraged engagement, with learning as a welcome but secondary aim. Further research can be focused on designing location-based games with the primary aim of promoting knowledge acquisition, directing the analysis of the resulting gameplay into what happens in terms of learning outcomes.

Finally, as mentioned in the previous chapter, I did not develop or study all categories of location-based games in museums, including live-action roleplaying games and alternate reality games. The development and study of these types of games, as well as the effect of the resulting gameplay in the museum experience, represent possible lines of investigation that will result in deeper research into game mechanics and game design strategies that were not fully addressed in this thesis. For example, alternate reality games imply a reliance on different media and a more prolonged engagement with the game than the case studies explored in this thesis, while live-action roleplaying games involve a bigger focus on story and roleplay. Given enough time and resources, museums can create games meant to be played both inside and outside the museum, that engage players for prolonged periods of time, and that reach them through different media, from phone calls, to print publications, and social media, among other possibilities. As for story and roleplay, as addressed throughout this thesis, all museums have stories to tell. As players with a clear role to play in that story, visitors can become protagonists in the museum's stories. While studies on these types of games in museums exist (Moseley, 2011; Simon, 2010), an in-depth study of the design, gameplay and the effect of these types of engagement on the museum experience represents yet another possibility for research.

To Conclude

Location-based game design allows museums to create interactive and entertaining gameplay experiences that emphasize the connections to the context where they are played. The resulting gameplay incorporates the unique characteristics of each museum and requires players to travel there and interact with it in order to play. I began this investigation with the objective of understanding the current theory, practice and effects of developing location-based games for museums, but also seeking to enact change through that understanding and through the creation of a game design framework. Beyond engaging in an investigation focused solely on theory and gameplay, the opportunity to develop practical research into game design while embedded in a museum context gave me a privileged perspective on the real-world application of the knowledge produced. As a result, this interdisciplinary and multi-perspective methodology allowed me to not only conduct research in this emerging field, but also to shape the object of my research by directly contributing to and potentially guiding its development. Influenced by my own interdisciplinary background as a researcher and museum professional, the end result is a game design thesis firmly rooted in museum studies, an interdisciplinary work informed by theory and practice, and a research project with real-world applicability.

Ultimately, the value of this investigation lies in a diverse set of small yet significant contributions to the field, resulting from an interdisciplinary and multi-perspective investigation which allowed a holistic view of location-based game design in museums. These contributions include, first of all, the novelty of the endeavour, that is, engaging in a multi-perspective study of the use of location-based games in museums to create motivation and engagement, conducting that investigation from the point of view of the museum, as a game designer and game player. The value also lies in the creation of the game design framework, which will give museum professionals and game designers guidelines on how to develop their own work in location-based game design, and upon which to build increasing experimentation and knowledge. Finally, the value of this work lies in the contribution to knowledge in both fields. To game studies, specifically in the design of pervasive games, by representing an in-depth study of a particular context for that practice and creating a set of guidelines that game designers can follow to develop new work. To museum studies, by developing the

understanding and process of developing additional tools for their engagement toolbox, and by suggesting a potential model for museum engagement in the form of the gameful museum.

What I did while conducting collaborative research at RAMM was a case study on how to begin to build a gameful museum through location-based game design, with the external case studies as further examples of the diversity of approaches. Much remains to be done in order to see how the framework and guidelines outlined here help develop new location-based games for museums, and how they can help game designers and scholars study other contexts for the design of location-based games. My hope for this thesis and the work developed during this investigation is to provide an approach to the collaborative design of games that integrate the museum, its space, objects, knowledge, stories and staff into gameplay in ways that enhance the museum experience, and that it facilitates that task with the examples, case studies and game design framework presented here to serve as guidelines.

Appendices

Appendix A. Player Researcher – Process

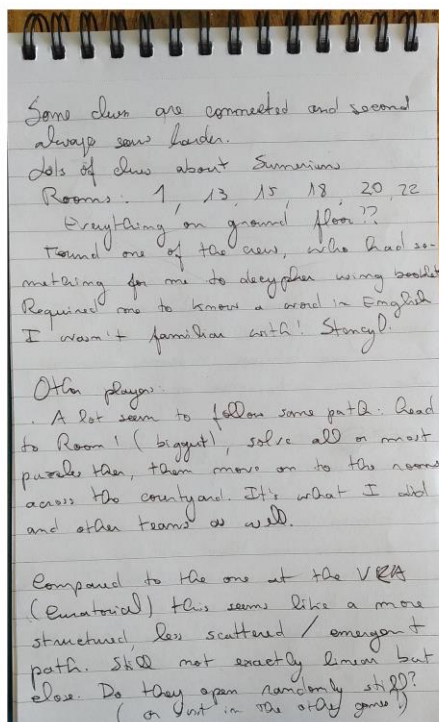
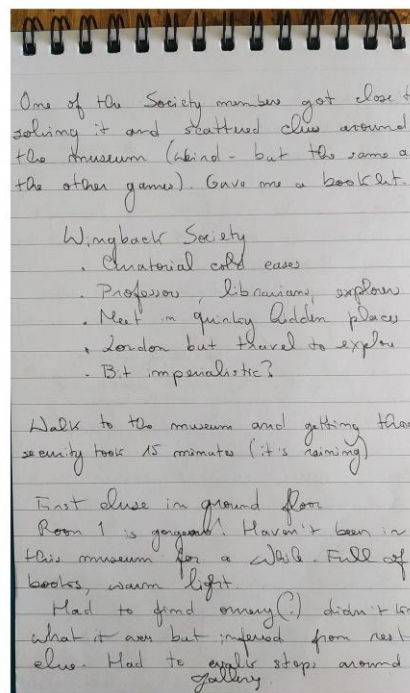
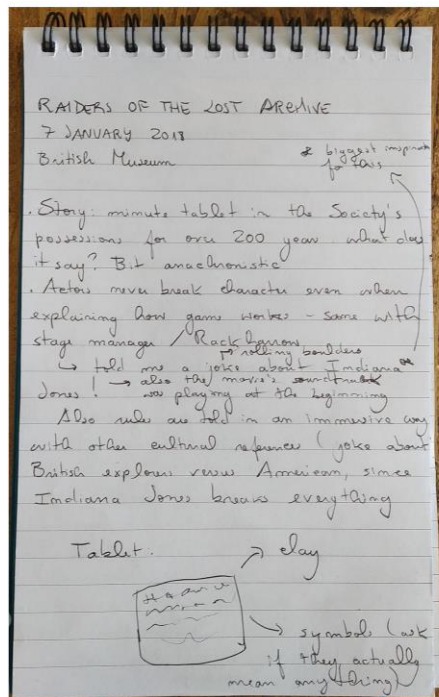


Appendix A.1. Gameplay Notes

Appendix A.1.1. Notes on a gameplay session of *Raiders of the Lost Archive – Lost in Translation* by Fire Hazard Games

1. GAMEPLAY NOTES

Excerpts of handwritten and digital notes with thoughts and observations on my gameplay experience, related game design choices, and how they impacted my museum experience, while playing games created by other game designers.



Notes on a gameplay session of *Raiders of the Lost Archive – Lost in Translation* by Fire Hazard Games, 7 January 2018, British Museum. The notes refer to how the experience starts, the difficulty of the puzzles, and how the player's pathway is structured through the museum.

"(...) Compared to the one at the V&A (Curatorial) this seems like a more structured, less scattered / emergent path. Still not exactly linear but close. Do they appear randomly still? (or just in the other game)"

Feels more brainy and less exploratory. Maybe because of the museum: V&A feels more like a labyrinth, this one is more linear so less time on wayfinding. Harder puzzles!

→ Actually this is very interesting. How much do different configurations affect the gameplay? If the format is the same I can compare between museums. Location also means architecture and pathways!

~~Get~~ Got very confused about the following story one, wtf? Ask at the end.

Pantlmon is referenced.

More comparison: there are less variety of objects than in the V&A. Personally I find it less interesting but thematically definitely more focussed. Not as good as an intro to the museum? Maybe?

Lots of puzzle based on letters, finding words, reading stuff. Bit repetitive. I still like the maths ones!

Had a clue mention the booklet, this seems like a cool use of props.

Had to skip a few. This is much harder than the V&A. Ask them if it was a different game designer? On purpose?

Still fun and I love talking to the actors. Everyone else seems to be having fun too.

Ending: timed translation for different parts of the tablet. Everyone sitting at the Museum of Comedy with their heads down.

ENDING TO THE WINGED SOCIETY
MOTIVATION OF PROTECTOR / ORIGIN THIS

→ Apparently shows the beginning of the Society.

Prize: chocolate key

The tablet does say this: Easter egg.

Nine teams, came 7th. Spent too long writing notes...

Ask FHG:

- Who made this one?
- Story?
- Who wrote script?
- Wayfinding? Using gallery? Player pathways?
- Type of puzzle connect to theme?

"(...) Feels more brainy [sic] and less exploratory. Maybe because of the museum: V&A feels more like a labyrinth, this one is linear so less time on wayfinding. Harder puzzles! Actually this is very interesting. How much do different configurations affect the gameplay? If the format is the same I can compare between museums. Location also means architecture and pathways!"

"More comparison: there are less [sic] variety of objects than in the V&A. Personally I find it less interesting but thematically definitely more focused. Not as good as an intro to the museum? Maybe?"

Appendix A.1.2. Notes on a gameplay session of *Cambridge Codebreakers* by Fire Hazard Games

13 January 2018

Never been to Cambridge before! Excited.

Game starts at 10am, which is a lot earlier than the Raiders games (they're usually in the afternoon, starting at 2pm). Apparently this is because some of the museums included close during the afternoon: logistically, this game had more limitations than Raiders.

Main complaint from players to sm in the beginning: not having access to a team management system (because the system is more controlled and uses the ticketing system from the Cambridge Museums, instead of Fire Hazard's)

Performers have a different vibe from Raiders. More serious, less jokey. Fewer as well, only two.

Connected to an exhibition currently on at the Fitzwilliam. Also connected to Bletchley Park.

HQ is in a wine bar near the river. I got confused immediately trying to follow the map to the first museum and just used Google Maps.

Went to Fitzwilliam first. Cool museum. Love the codebreaking exhibition, it's small but very interesting.

Puzzles seem to be related to finding codes in nature, art, etc. A few don't make sense connected to the theme but are still fun.

Confused about the insect code in the paintings. Ask FHG later.

MAA next. Archaeology and different cultures. Cool museum but tiny spaces.

Sedgwick next. This is very old school museology, it's lovely but very hard to navigate.

Spending a lot of time trying to find anything. Fossils everywhere. Wayfinding tricky.

Wanted to go to Classics but ran out of time. It's also very far away. Unlikely that anyone can go to all museums or at least complete all of them.

Endgame: we've cracked cryptography forever (this seems a bit far-fetched). Do we publish the knowledge or destroy it? For me, destroy.

Most people voted for publish. What?!

Notes on a gameplay session of *Cambridge Codebreakers* by Fire Hazard Games, 13 January 2018, Cambridge. The notes refer to how the game frames a first-time experience of the museums (for example, the confusing spatial organisation is more notorious here than in a normal visit) and the city itself (as the game requires visits to several museums). I also mention how being a player-researcher effected my gameplay.

"The fact that you have to walk around the city, instead of just staying in the same museum, means that there is an added sense of urban exploration, particularly for players who don't know the city and / or don't know the museums (...)"

"Wayfinding / exploration / puzzle solving, more than environmental storytelling and roleplaying."

"Having a story makes it more personal."

"I found some of the puzzles harder, but that might have been because I felt the pressure of time more in this one than in the others, since I wanted to visit at least three museums."

Came 9th. I think trying to visit several museums had a bad effect on my score. I had to leave behind puzzles in order to visit more places. Possible the sweet spot is two out of four museums? But it's nice to have variety of spaces and collections.

Post-game:

The fact that you have to walk around the city, instead of just staying in the same museum, means that there is an added sense of urban exploration, particularly for players who don't know the city and / or don't know the museums (I used Google Maps to find the fastest route to the next museum). I didn't know the city at all as it was my first time in it.

Wayfinding / exploration / puzzle solving, more than environmental storytelling and roleplaying.

The choice at the end raised interesting discussion and questions about the ethics of cryptography, something which relates the game thematically even more to the exhibition. In the game session I attended, the vote was close, but Publish won. I asked the crew members how the choice had usually played out, and they said that so far only one group had chosen to destroy the software that would end cryptography, rather than publish it freely online. They mentioned that players sometimes asked for a third option: that of not destroying it, but keeping it a secret, so that it can be used without everyone knowing about it (ethically speaking, this raises even more questions about access to knowledge, right to privacy, right for the public to know who as this kind of access).

Having a story makes it more personal. The hints (excerpts from letters, personal communication from characters) given about the story and the relationship between characters throughout the game added to this.

I found some of the puzzles harder, but that might have been because I felt the pressure of time more in this one than in the others, since I wanted to visit at least three museums. One could theoretically visit all museums, but the time spent traveling from one location to the other is time not spent solving clues, so in competitive terms that makes no sense (I could do it because I was not playing to win, but to explore).

Appendix A.1.3. Notes on gameplay sessions of *Treasure Hunters* by Aardman and the Science Museum Group

21 April 2018

Treasure Hunters App

Science Museum

45 minutes (with F)

Installed it on my Android phone along with F (also android). F used the museum's wifi, I used data.

Started in front of the shop.

App asks to choose an icon. These are very cute. Robots, spaceships, planets. Clearly made for children but adults can appreciate. Chose to play together in the museum (London). Tutorial simple.

Game gives prompts such as choose something that helps you communicate, choose something you can make noise with. We have to take a photo. It seems to accept whatever image we take?

Earn badges.

Using only one phone and having to hand it over is a bit awkward, but ultimately understandable. Would be nicer to have the option of playing together on different phones, even if both phones showed the same thing, but I guess that's not possible with an app?

Asks to debate which choice is the best. **Problem: debating which object is better for anything is a matter of subjective opinion. Asking the app to decide however is even worse because while it is unclear how it decides, it feels completely random.** When asked to take a photo of something that would help us get home, the app chose the USS Enterprise over an airplane. It took me a few tries to realise it's choosing randomly, but it just gives rise to silly situations. F was delighted though.

Other stuff: something that's made of fabric; something that's waterproof, something that makes you happy, something that you can use to communicate, something that goes inside you, the biggest wheel you can find.

F mentioned that it felt like we didn't need to be in the museum to play this game. Even though we were asked in the beginning of we wanted to play in the museum or elsewhere, and if in the museum, which one, which makes me think that the challenges are specific to each museum even though they don't feel like it. But is this true? How can I find out? And does it even matter that much to the experience? It still feels generic and not location-based.

Doesn't really require you to visit a specific gallery, or even more than one gallery. We could stay still and take photos of stuff around us. Obviously not going to, but seems like it could give us more motivation to move and explore.

This eats battery life.

Earning badges seems too easy and random.

No clear structure or ending. It ends when we want to, which leaves the player without a sense of completion. It also leaves without a sense of purpose or understanding what the purpose of the experience is.

Ultimately the problem was that the challenges were too generic and it didn't feel like it used the museum as well as it should have. Not location based, could be played anywhere.

However, looking at the promotional photos, it seems like this is an app directed at children, which might have some effect on our enjoyment as adult players.

Feels strange going from competing to collaborating in the same game, without changing the fundamental mechanic.

We played for 45 minutes before F got bored. Verdict from F is that it doesn't really add anything to the enjoyment of the museum. I've been to this museum with F before and they didn't seem to enjoy it more this time.

Verdict from me: I've been here many times before and this is one of my favourite museums ever. **I don't feel like this experience adds much to my normal enjoyment of the museum. I'm not sure what I'm supposed to gain from the fact that I've found and photographed an object that is waterproof / used to communicate / made from fabric etc. It's even less appealing to me as a multiplayer experience due to the fact that the debates ultimately made no sense and had no consequence.**

Maybe this is a matter of mismatch between game and player. This is definitely directed at children. Finding stuff is fun and I guess it keeps them entertained. It's just that ultimately seems to fall flat.

5 May 2018

Science Museum

By myself

30 minutes

Selected one player instead of two.

Playing alone feels even less interesting as it's very difficult to feel motivated. It just feels pointless and doesn't add much value. You can take a photo of anything and it will award you a badge and say you did a good job. There is no challenge involved beyond finding something. This is not that different from my quest, but mine at least felt more specific to the location (museum and city), and told you interesting facts about the place in connection to the museum's collection. This one doesn't really tell you anything about the objects (or about anything else). Confirming that it doesn't seem to make use of the museum as a location.

Good: visitors enjoy taking photos in the museum anyway (I also used this in the quest). This helps structure that activity in a way that isn't too difficult or out there. But I'm not sure if this is enough. What does it add to the experience? How could it be changed so that it adds something more? Is this something with the design, mismatch with target group, or the museum itself not being conducive to this, or a combination?

Notes on gameplay sessions of Treasure Hunters by Aardman and the Science Museum Group, April and May 2018. The notes show my frustration at the experience, specifically at the seeming randomness of challenges and at the lack of deep engagement with the museum content.

"Problem: debating which object is better for anything is a matter of subjective opinion. Asking the app to decide however is even worse because while it is unclear how it decides, it feels completely random."

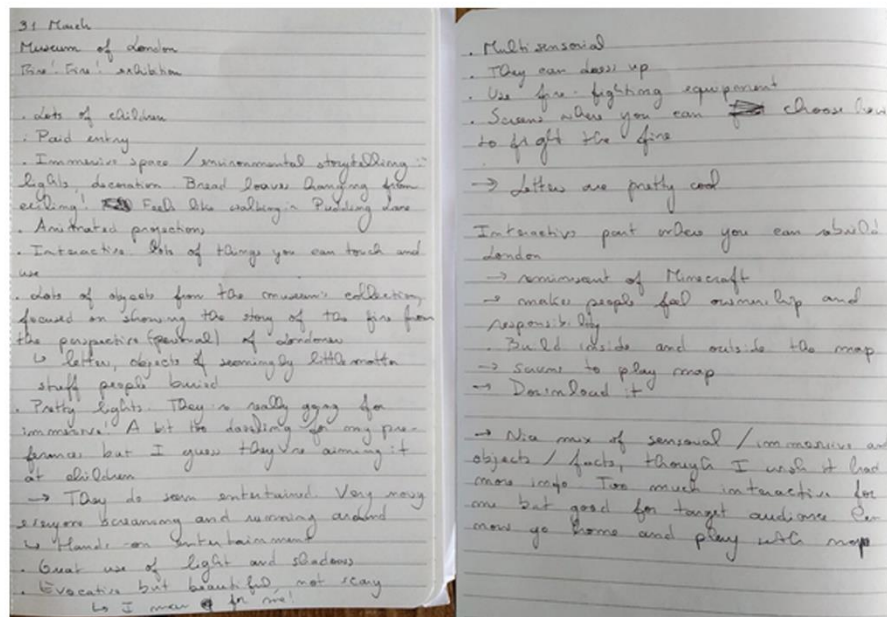
"F mentioned that it felt like we didn't need to be in the museum to play this game. Even though we were asked in the beginning of we wanted to play in the museum or elsewhere, and if in the museum, which one, which makes me think that the challenges are specific to each museum even though they don't feel like it. (...) It still feels generic and not location-based."

"Doesn't really require you to visit a specific gallery, or even more than one gallery. We could stay still and take photos of stuff around us. Obviously not going to, but seems like it could give us more motivation to move and explore."

"No clear structure or ending"

"I don't feel like this experience adds much to my normal enjoyment of the museum. I'm not sure what I'm supposed to gain from the fact that I've found and photographed an object that is waterproof / used to communicate / made from fabric etc. It's even less appealing to me as a multiplayer experience due to the fact that the debates ultimately made no sense and had no consequence."

Appendix A.1.4. Notes on visit to the *Fire! Fire!* exhibition at the Museum of London



Notes on visit to the Fire! Fire! exhibition at the Museum of London.

"Lots of objects from the museum's collection, focused on showing the story from the fire from the perspective (personal) of Londoners – letters, objects of seemingly little matter, stuff people buried (...)"

"Interactive part where you can rebuild London: reminiscent of Minecraft. Makes people feel ownership and responsibility"

"Nice mix of sensory / immersive and objects / facts, though I wish it had more info. Too much interactive for me but good for target audience. Can now go home and play with map."

Appendix A.1.5. Notes on gameplay sessions with accompanying *Minecraft* maps to the Fire! Fire! exhibition at the Museum of London

12 April 2017

Game session: 40 mins (install + play)

- . Lots of places to place collected items. Probably don't need to get every single one of them for progression?
- . Map looks very pretty. Textures?
- . Starts inside a boat in the Thames
- . Collecting tattered maps that show your location and location of interesting points in the map. Otherwise hard to navigate (hard to know where I am)
- . Oddly empty. Looks like a version of London but not having people I don't associate it with London. Could have NPCs?
- . Just walking around is interesting. Had never seen such a detailed map of London. Looks much better than a lot of maps I've seen before of other stuff. Wonder how long it took to be built? Textures are great but map is a bit slow (maybe my computer)
- . Found a record on top of the cathedral. Audio makes map feel less lonely. Cool storytelling item that makes sense inside the game. Story of lightning strike that caused a previous fire. Voice?
- . Walking around great but getting to places not always easy. Should allow flying?
- . Lost interest on getting the items, feels nice to just walk around and explore
- . Wonder how this look when on fire?
- . Figure out how they built this. All by hand? Buildings look detailed and distinctive but seems like it would take way too long to do it. How many people?

Game session: 40 mins

Second map: London is on fire

- . Maps starts by asking what an item is, answer is fire. Door opens (it's an iron door)

. Walked around the room looking at objects to fight the fire (squirt, fire hook) and other things (chest)

- . Clicking grey buttons gives more info
- . Accidentally clicked on a wall that too me right to the middle of the fire?
- . Note: do not walk into fire
- . Was I supposed to have picked up the fire fighting items in the beginning?
- . Re-installed the map
- . Start again, you can talk to NPCs to get quests in the form of scrolls next to head
- . Items were in the exhibition, accurate enough replicas
- . Clicked Start Day 1 Game
- . Taken to a building on fire, lots of smoke everywhere
- . Need to escape, break window
- . Found axe, used on window, quest log updated
- . Outside everything is burning, result quite striking. Looks pretty if unnerving
- . Explanation of how fire-fighting used to work from NPC, with images (incongruous), reminds me of exhibition
- . Talk to bystanders, Thomas Farriner
- . Need to find a church? Follow firey path. Again, confusing to navigate otherwise
- . Soundscape: church bells, crackling fire
- . Trying to fight the fire with a bucket and shooting water arrows
- . Immediately see it's no use, too much fire
- . Again my interest is more on exploring than completing the quest. My completionist instinct isn't very strong here

18 April

Game session: 30 mins

- . Pull green lever to open doors
- . Inside palace
- . Instructions: talk to architects to receive building blocks
- . King Charles II surrounded by guards, nice contextual flavour and helps make the map look at least a bit populated
- . Map really pretty: textures, architecture
- . Given a block that looks like a miniature house piece. Can place in a green surface
- . Roads + red brick house
- . Captain Valentine Knight? Follow
- . London burned down, it's just a shell of the first map. Result is poignant and sad even though it's blocky and doesn't look realistic. More in comparison to previous map than to the real city
- . Nice connection to the part of the exhibition where we can rebuild London
- . Architects are next to images of plans for future London. I'm sure I remember them from the gallery. They talk about their own opinions for rebuilding the city
- . Got a mini monument
- . This is like they made a miniature Minecraft / lego game inside Minecraft
- . A lot of the info I'm already somewhat familiar with from the exhibition. This adds more interaction in a way that kids probably associate with gaming and Minecraft specifically. Makes it interactive and fun but I'm not sure how much attention they might pay to the NPCs explanations. Probably doesn't teach much about urban planning but at least puts players in a position where they can actually do it
- . Not sure it works in how it shows the different architects one after the other.
- . Still fun and engaging and potentially a good educational tool.

Notes on gameplay sessions with accompanying Minecraft maps to the Fire! Fire! exhibition at the Museum of London, April 2017. The notes refer to the elements found inside the maps and how they relate and add to what I found in the exhibition, showing evidence of how gameplay enhances the content in the museum.

"Found a record on top of the cathedral. Audio makes map feel less lonely. Cool storytelling item that makes sense inside the game"

"Walked around the room looking at objects to fight the fire (squirt, fire hook) and other things (chest)"

"Items were in the exhibition, accurate enough replicas"

"Explanation of how fire-fighting used to work from NPC, with images (incongruous), reminds me of exhibition"

"London burned down, it's just a shell of the first map. Result is poignant and sad even though it's blocky and doesn't look realistic. (...)"

"Nice connection to the part of the exhibition where we can rebuild London"

"Architects are next to images of plans for future London. I'm sure I remember them from the gallery. (...)"

"This is like they made a miniature Minecraft / lego game inside Minecraft"

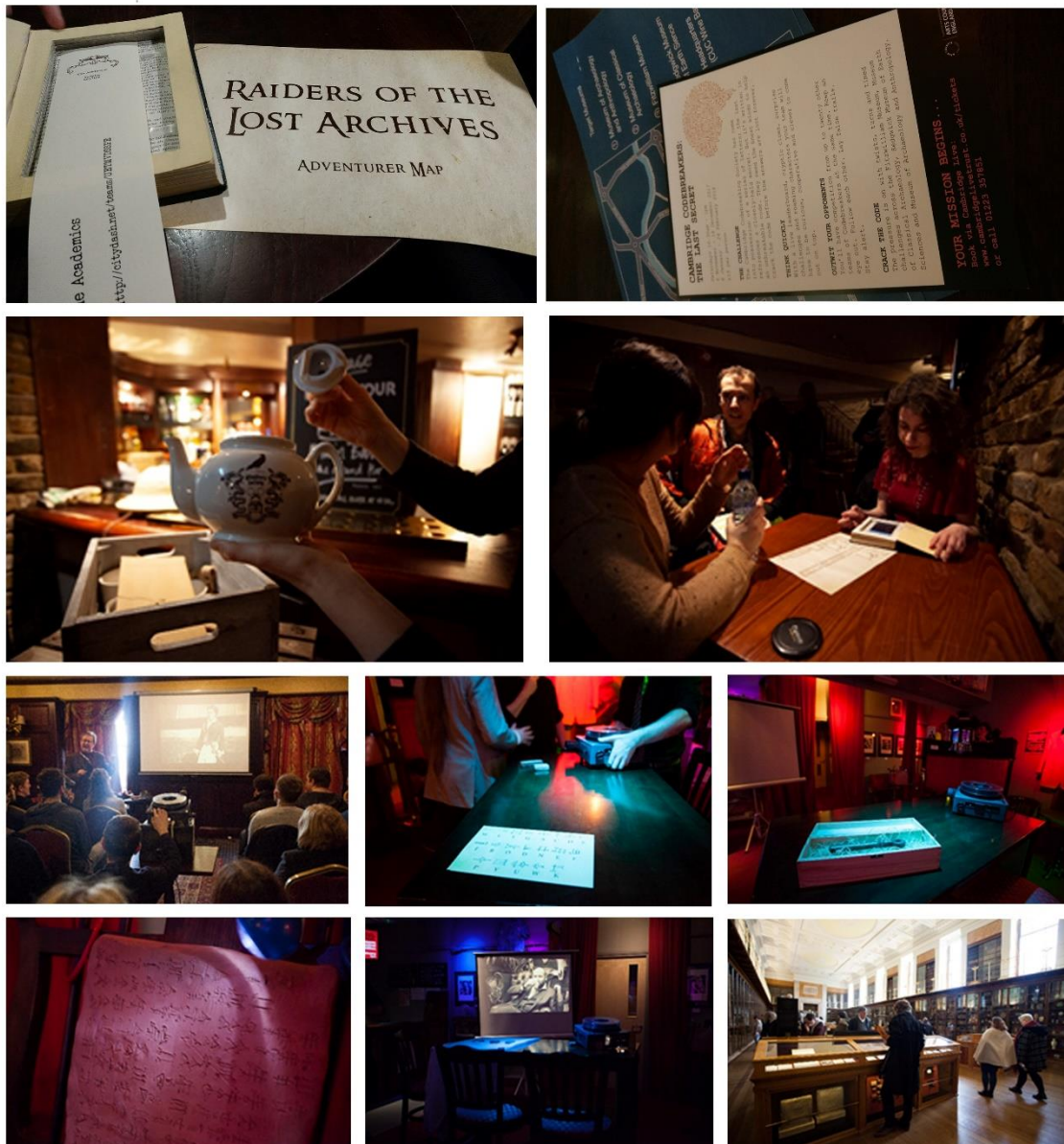
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Appendix A.2. Visual Documentation

Appendix A.2.1. Photos from gameplay sessions of *Raiders of the Lost Archive* and *Cambridge Codebreakers* by Fire Hazard Games

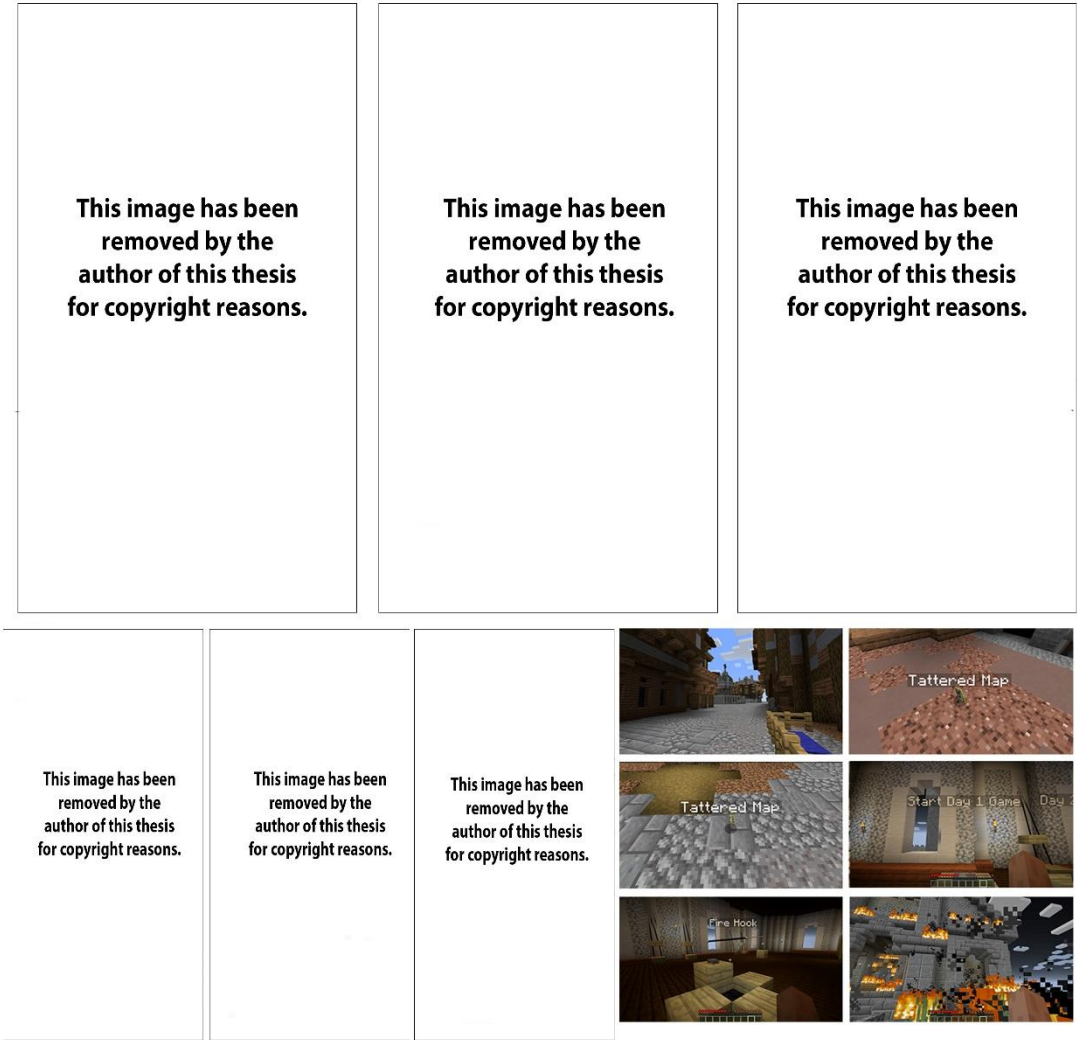
2. VISUAL DOCUMENTATION

Photographs and screenshots taken of the games, apps and museums during my gameplay experiences of games created by other game designers.



Photos from gameplay sessions of *Raiders of the Lost Archive* and *Cambridge Codebreakers* by Fire Hazard Games (first photo from August 2017, all others taken between January and April 2018). The photos show the briefing scenes for the game, which introduce players to the Wingback Society and show how the experience is brought to life with props, maps and actors.

Appendix A.2.2. Screenshots from gameplay sessions of *Raiders of the Lost Archive* and *Cambridge Codebreakers* by Fire Hazard Games, *Treasure Hunters* by Aardman and the Science Museum Group, and *Minecraft* maps accompanying the exhibition *Fire! Fire!* at the Museum of London



Screenshots from gameplay sessions of *Raiders of the Lost Archive* and *Cambridge Codebreakers* by Fire Hazard Games, *Treasure Hunters* by Aardman and the Science Museum Group, and *Minecraft* maps accompanying the exhibition *Fire! Fire!* at the Museum of London.

Appendix A.3. Other Players - Photos and excerpts from interviews with players of *Raiders of the Lost Archive* by Fire Hazard Games

3. OTHER PLAYERS

Interviews and observations of other players of the same games I played as player-researcher.



Photos and excerpts from interviews with players of *Raiders of the Lost Archive* by Fire Hazard Games, 24 February 2018, British Museum. The photos show how players carry their phones in hollowed books, how the phones anchor and direct their actions during the game, how they interact with one another, the phone and the map, and how they solve puzzles by studying the exhibits in the museum. The interview evidences the ways in which the game framed and focused their experience of the museum, by adding a goal, tasks to fulfill and a time limit.

24 February 2018

SR: So what are your thoughts in general about the game?

P2: I think that it's funny, and it's quite curious. It lets you discover the museum.

P1: It's actually also very interactive in the way that... I noticed that, especially when you're searching for clues, you're seeing more details of certain elements.

P3: You actually can read properly, and see a little bit of the story, and learn more.

P1: Yeah, exactly. It's also the reason behind... Normally, I think that these objects we have been looking, normally I never would have looked at them. I would pay attention to bigger things, because you only have so much time in a museum.

P3: And another thing is that you're not sitting down. You're actually, you know, doing some exercise.

P1: You're running in the museum? [laughs]

P3: No, you shouldn't run in the museum, you should walk. [laughs] But yeah, you feel good. I think that's important as well. (...)

SR: So what did you think of the clues, the puzzles?

P1: Some of them were really difficult to understand. Like that thing with the calculations, I mean, that was really one that...

P2: It was our first time, so maybe we don't know... At least I didn't expect to find those mathematical puzzles. But some of the clues were quite easy if you have a bit of time, which we don't have, but you can find everything there, you just need to focus and be organised. We were only three, maybe five people would be better to spread around.

P3: I don't know if maybe for beginners, we should have more time, maybe? I don't know, and then... It's one of those things I don't know, if people are more experienced, the level of difficulty could be increased, in terms of time and all that. But for us, for example, yeah, it was the first time that we tried this game, so probably a little bit more time would have been helpful.

P1: The questions in general were actually good, because you didn't have to have knowledge in order to find the answer. It was really just to find it there, looking

around... That is good, I think, because even people that don't know a lot about it can find answers.

SR: What was it like to interact with each other in your team?

P2: It was good. We managed to find...

P3: We just lost each other once, I just lost you guys once, [laughs]

P1: I think it worked actually quite well. (...)

SR: Do you usually visit museums?

P1: What is usually? [laughs]

SR: How often do you go?

P3: It used to be often, now it's not as often, to be honest, which is a pity.

P1: Yeah, it's a pity, we need to go more.

P2: I usually go to museums. I try to... I mean, when there are exhibitions.

SR: How many times per year?

P2: Three. I definitely go, to ten, if there are some interesting exhibitions.

SR: What about you?

P1: Ten, I would say. A year, yes, ten.

P3: In a year? Probably a bit less than ten, [laughs] Maybe six or seven.

SR: So how does this experience, this visit to the museum, basically, how different was it? In what ways was it different from the other times that you visited?

P3: Because now we had a goal, an objective, you know, a task that we need to fulfil. Other times, you just go as a tourist, you just pass by, you go and read about one or another thing that actually caught your attention. It's different that way.

P2: You actually do not visit the whole museum, but just... There is a theme, a topic, and you visit the rooms that you have to, in order to get to the clues. So it's different.

P1: Yeah, exactly. So you have a goal. Let's say, with these tasks, you are really focused on finding the answer, which is good in a way, because you learn about things

that you would never look at, but, at least for me, I just focused on that. So for the rest, I disregard anything else. [laughs]

SR: So it was more directed, more structured than a normal visit?

P2: It was more guided, because you have to follow the clues.

P1: But the good thing about it is that you're forced to understand where you are, so you look at your map, and you automatically start understanding where the different divisions are. So next time, for example, if we go to a visit, you more or less know, okay, that is there, this was there, the Roman area was there, there you have the big library, then you also have the Chinese room, so all these things, that yes, yeah. So it was a good introduction for the next visit. And then in the next visit, you can look again, you build on top of that.

SR: Would you visit more museums if there were more games like this?

Everyone: Yes. (...)

SR: Did you learn anything new today, and what is one thing that you learned that stands out in your mind? In the puzzles, the clues?

P2: Well, I didn't understand, for example, the... What was it about the walrus and the dove, the shape? What was the other one? Well, the famous lion that is also a penis. [laughs] That was quite a bit of fun. I didn't expect it.

SR: Was that your favourite object? [everyone laughs]

P1: I don't know what to say.

SR: I mean the most memorable.

P2: Yes, that was the most memorable.

P3: I think for me it was the beginning, when we had the part with the goddesses and all that stuff. Thought it was interesting when they connect everything. I'll probably go back there and read things properly and try to understand. It was interesting.

P2: The soldier in the procession, wearing a bird on top of his head.

P1: But that is what I really like, because it's so colourful. That was really so beautiful, that was a really beautiful piece. That's the thing I remember from the whole tour. The bird thing was weird. (...)

P3: We had the time pressure, we had to get competitive.

P1: You just need the minimum information in order to find the clue, and when the clue is found, you stop, and then you go to the next one. So all these links, these connections, I didn't see at all. That's why, you know... So at the beginning, it was a love story, in the middle it was just tests all around, I even didn't really make the connection with love so much. Okay, so all the games that you saw... At least I was just in practical mode. And then, at the end, with the story...

P3: We didn't have time. At least, I found that we didn't have time to do the connection. You have to continue, otherwise you're not going to win. You have to stick to it.

SR: How easy was it to find the right room, and to walk the museum, to navigate the museum?

P2: With her [P1] it was quite easy. [everyone laughs]

SR: So you're the map person.

P1: Yeah, I wasn't, but it seems like I am now. Next time, I know my role. That will be my role, the map person.

SR: Do you feel like, if you go back to the museum now, you know the galleries better?

P1: I could draw that stuff now. I could draw the different rooms where we've been. (...)

SR: Are you planning on coming back to this museum? Did this game today make you want to come back to the British Museum?

Everyone: Yes.

SR: What do you think that you are going to do when you come back? What do you want to see in particular?

P3: I would go back to the first room that we've been.

SR: The Asian cultures.

P2: I've been there, not just because of the clues, but before as well.

P3: I don't think I retained anything, so maybe now I'll go back and look with other eyes.

P2: It's like [P1] was saying, we didn't actually notice all the details, you don't expect to see a sexual or love connection in these things.

P1: That's the thing, for me also, when I go to the museum, you almost glance through it, and you take some bits and pieces, because also when you go to the museum, at least for me, it's such a big museum, you have a limited period of time, you cannot do everything. So what you do then is glance through the things, you don't pay so much attention. And now at least you paid attention to certain parts, and I have the feeling I can connect with that. Then you can go back, and you can build upon that. So that was the impression that I had. That was actually nice.

P3: "Because now we had a goal, an objective, you know, a task that we need to fulfil. Other times, you just go as a tourist, you just pass by, you go and read about one or another thing that actually caught your attention. It's different that way." P1: "(...) it's such a big museum, you have a limited period of time, you cannot do everything. So what you do then is glance through the things, you don't pay so much attention. And now at least you paid attention to certain parts, and I have the feeling I can connect with that. Then you can go back, and you can build upon that."

Appendix A.4. Other Creators

Appendix A.4.1. Excerpts from interview with Elizabeth Simoens from Fire Hazard Games during the author's research residency in London. Photo of the shared office with the author's desk during the residency

4. OTHER CREATORS

Interviews and observations carried out with other game designers about their games and design processes.



Excerpt of interview with Elizabeth Simoens (Fire Hazard Games)
10 January 2018, London

SR: (...) [when creating games for museums] there seems to be an emergent quality of unexpectedness, because you cannot control the environment completely, and you have other people playing at the same time. Do you feel like that adds a complexity that's fruitful?

ES: I think so. One way to explain it is, when I'm making a game for the streets of London, I know the streets of London as a particular side. As a location-based game, it's interesting, but only to a certain extent. Whereas in a museum, you walk around and you go. I didn't even know that existed before. They have a lot to work with, because each item has a paragraph about what that item is, or why that item is important, and then you can dig deeper to find other things about it. Then you think, how do I make a puzzle out of all of this? (...) It's fun to have that as a place for players to explore, especially for them to explore in a different way from what they normally would in a museum. In visits to museums, you see maybe five percent of each room, because you just walk through, instead of getting focused on certain things (...).

SR: Can I ask you more focused questions about the actual game creation process? How do you come up with topics and stories?

ES: Sometimes it's really, really easy, especially if there's a brief, like in the Cambridge games. They had the Codebreakers and Groundbreakers exhibition [at the Fitzwilliam Museum] and needed a game for the exhibition, which is based on Turing, the Enigma machine, and all the codes. From there you go, okay, this is the set, this is the background, and you create a story from it that fits into all those pieces. (...) Generally we think, okay, the next game is going to be in the British Museum, maybe we have to do it by floors so that people don't have to move too much. Those are our initial game design restrictions. The first floor has lots of Mesopotamian, Assyrian and Egyptian works, and there's a lot of cuneiform script, hieroglyphs and that kind of stuff. There's also the Rosetta stone, so you go, eh, this is going to be a story about translation. That's what makes sense when you consider the space, and that's how the game gets created (...). It's the site-specific work coming back in. You go into the

location and ask, what are the main facets here? What spaces in this big museum do I want to use and why? What's interesting about the things in this space, and how do I tie that to the society that we have created?

SR: It sounds like you consider the physical space, not just the objects, but also the architecture, the exhibits, and the physical journey, or the path, that players take through the museum. How does that inform the design of the games?

ES: It informs it in simple ways. In the first game, they weren't thinking about that so much, and there were problems. (...) If you go through an area where there's a really, interesting object, but it's a high traffic flow space, you want to make sure you make an easy to solve entrance clue to that area. You end up letting the space shape where different types of clues go. (...)

SR: Do you want people to be able to see different parts of the museum during the game, instead of focusing too much on one space?

ES: You want people to have a varied experience. Our clues are randomized, so we don't control what pathway players go through in the museums. They can skip a clue whenever they want, and they can choose what room to go to next. We've adjusted that a bit for games like Cambridge and the British Museum, because it's just so crowded and big, so we open clues in the same area sooner than clues that are far away, so you don't have to move as much. But if players decide that they just want to go to that clue far away, that's still an option for them. (...)

SR: It's possible to identify references to pop culture, such as Indiana Jones, throughout the games. Can you talk a little bit about those cultural references and inspirations?

ES: We use a lot of Indiana Jones references, but also references to people's interest in the Victorian era, the coffeehouses and the old private members clubs. (...) We lean a lot on that cultural capital, since people are aware of those types of characters from popular media. (...) I happen to love point and click adventure, detective and puzzle games, specifically games like Puzzle Agent and Puzzle Agent 2, because they're really fun, and also very silly. Or games like Thimbleweed Park, Phoenix Wright and Professor Layton (...). Those games are definitely in the back of my mind when I'm solving things, or creating things, or designing the games.

Excerpts from interview with Elizabeth Simoens from Fire Hazard Games during the author's research residency in London, showing how the process of creating the game is itself location-based in that the theme, player journey and gameplay are inspired by the museum and the content therein. Photo of the shared office with the author's desk during the residency.

"It's fun to have that as a place for players to explore, especially for them to explore in a different way from what they normally would in a museum. In visits to museums, you see maybe five percent of each room, because you just walk through, instead of getting focused on certain things."

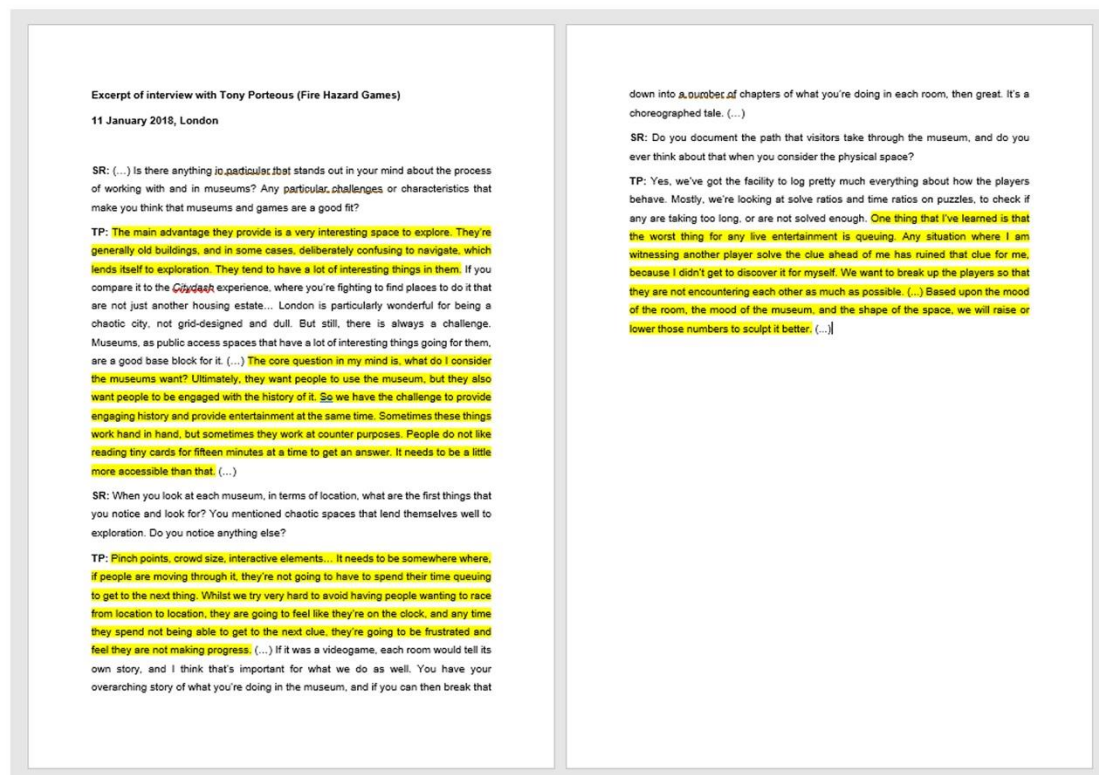
"That's what makes sense when you consider the space, and that's how the game gets created. (...) It's the site-specific work coming back in. You go into the location and ask, what are the main facets here? What spaces in this big museum do I want to use and why? What's interesting about the things in this space, and how do I tie that to the society that we have created?"

"(...) If you go through an area where there's a really interesting object, but it's a high traffic flow space, you want to make sure you make an easy to solve entrance clue to that area. You end up letting the space shape where different types of clues go."

"Our clues are randomized, so we don't control what pathway players go through in the museums. They can skip a clue whenever they want, and they can choose what room to go to next."

"We use a lot of Indiana Jones references, but also references to people's interest in the Victorian era, the coffeehouses and the old private members clubs. (...) We lean a lot on that cultural capital, since people are aware of those types of characters from popular media."

Appendix A.4.2. Excerpts from interviews with Tony Porteous and Amy Strike from Fire Hazard Games during the author's research residency in London

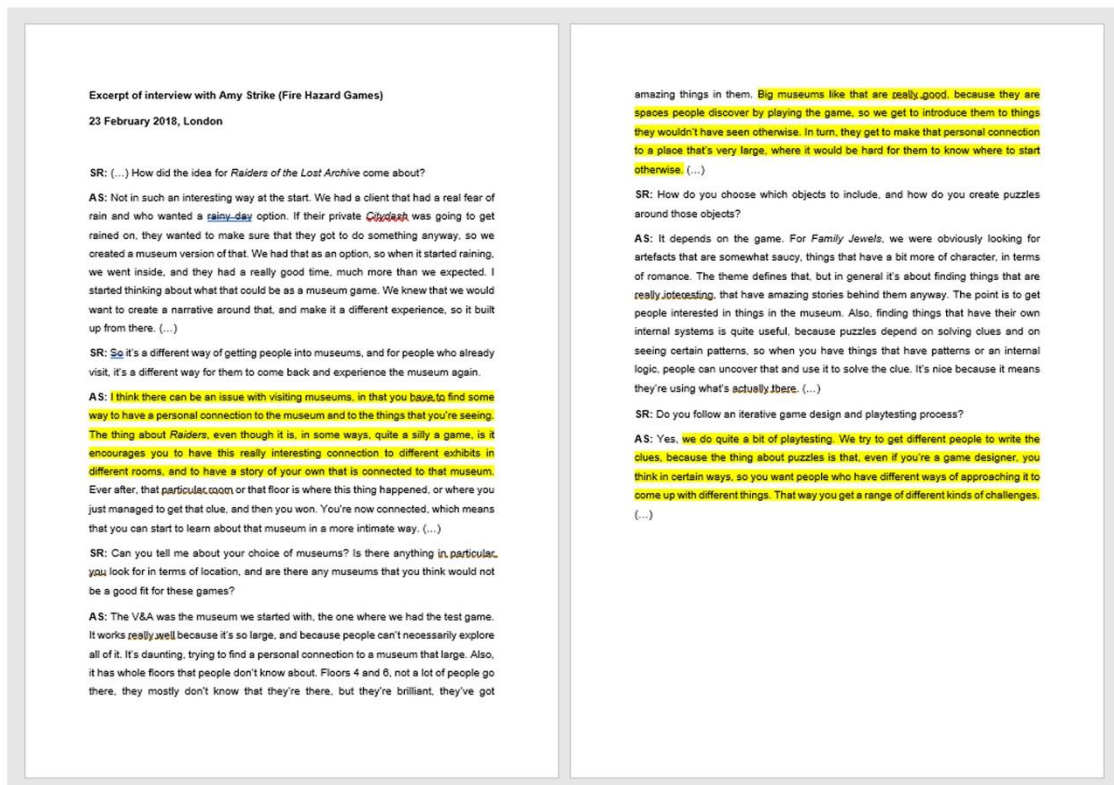


Excerpts from interview with Tony Porteous from Fire Hazard Games during the author's research residency in London, showing how the physical characteristics of the museum are taken into account when designing the game.

"The main advantage [museums] provide is a very interesting space to explore. They're generally old buildings, and in some cases, deliberately confusing to navigate, which lends itself to exploration. They tend to have a lot of interesting things in them."

"The core question in my mind is, what do I consider the museums want? Ultimately, they want people to use the museum, but they also want people to be engaged with the history of it. So we have the challenge to provide engaging history and provide entertainment at the same time."

"Pinch points, crowd size, interactive elements... It needs to be somewhere where, if people are moving through it, they're not going to have to spend their time queuing to get to the next thing. Whilst we try very hard to avoid having people wanting to race from location to location, they are going to feel like they're on the clock, and any time they spend not being able to get to the next clue, they're going to be frustrated and feel they are not making progress."



Excerpts from interview with Amy Strike from Fire Hazard Games during the author's research residency in London, showing the game designer's perspective on the value that the games bring to the museum experience.

"I think there can be an issue with visiting museums, in that you have to find some way to have a personal connection to the museum and to the things that you're seeing. The thing about *Raiders*, even though it is, in some ways, quite a silly game, is it encourages you to have this really interesting connection to different exhibits in different rooms, and to have a story of your own that is connected to that museum."

"Big museums like that are really good, because they are spaces people discover by playing the game, so we get to introduce them to things they wouldn't have seen otherwise. In turn, they get to make that personal connection to a place that's very large, where it would be hard for them to know where to start otherwise."

"(...) we do quite a bit of playtesting. We try to get different people to write the clues, because the thing about puzzles is that, even if you're a game designer, you think in certain ways, so you want people who have different ways of approaching it to come up with different things. That way you get a range of different kinds of challenges."

Appendix A.4.3. Excerpts from interviews with Ju Row Farr from Blast Theory during the author's research residency in Brighton

Excerpt from interview with Ju Row Farr (Blast Theory)

8 June 2016, Brighton

SR: (...) a lot of your work consists in experiences that can be considered game-like, that have characteristics which approximate them to games. Is this a conscious decision? Are games a conscious influence on your work?

JRF: Yes, I think they are. Often when we're making work, we're looking for a structure that satisfies the theme, or the subject of the work. It's like a dramatic arch in three stages. There are very clear boundaries within games, which can give people a route through the work, when that work isn't *definitely* a live event, or *definitely* a performance. If it's hard to categorise what it is, the structure of having a name, a goal, and having to do certain things to get to that goal, gives people a line to follow in the work. (...) We put people in that position where you can play a game in lots of different ways, or you can watch the game being played whilst you're still inside it. That agency for audiences, or participants, or users, feels more contemporary and relevant today than sitting in a theatre - for us, anyway, although we would do that if it felt right, whether with or without a game-like structure. It's not that we're anti that. But the structures of games allow the audience to be a little bit more comfortable in their own skin. (...)

SR: Moving on to *Ghostwriter*. Can you tell me a little bit about what the experience was like?

JRF: *Ghostwriter* was made for the Royal Albert Memorial Museum. The experience of *Ghostwriter* was: you went into the museum, and there was a large phone number on the wall. You chose whether you wanted to call that number or not. If you didn't have a phone, and you were still curious, you could get one from the reception desk. The idea was to explore the museum by choosing whether you went back in time or into the future. You called the phone number, and it was that very familiar kind of software where you get: 'press 1 for this', 'press 2 for that'. As a member of the public, if you chose to go back in time, you pressed 1, or to stay in the present and go forward, you pressed 2, while you went upstairs or downstairs in the museum. You had choices at each exit and entrance to a new room, and sometimes within a room as well: you

had a choice, or an activity to do. There was also a story sitting across the experience, a character who introduces that story, and takes you in both directions. In a way, you're being led by this female character, or voice.

Ghostwriter is about what it means to interact with history through objects. One of the things that was a challenge, but also exciting for us, was that we made the work because they were making a new part of the museum. It was challenging because of the idea, for me anyway, that you go to museums, and there are lots of old things, with signage or interpretation material which might not be especially interesting. You know that you're in a place where those things were important for a reason, and yet, they feel dry, old, and stale, and not relevant to your life right now. So we thought, we don't want to make a tour of these things, we can't actually feel that connection. What would that connection be like?

Because the museum was still being built, most things were out of the cases, so we weren't separated by glass. We weren't allowed to touch anything, and we had a chaperone taking us around. (...) But seeing stuff that had actually been worn, and thinking, for the first time, there had actually been a chest in there, with a heart that was beating, and there had been adrenaline, and it was probably sweaty, and dirty. Somebody had actually used that, there had been real life in there. Also, they had the old flints, hundreds of thousands of years old. You think, "Wow, that's really old", but then, the way that they'd arranged them in this one room, around a big doorway, was such they almost looked like a fleet of spaceships from Star Wars. So they were things that had personal and cultural relevance, and then they had popular culture relevance, as well as a kind of very tactile relevance. (...)

Suddenly we had a connection to these things, and we wanted people to go on journeys to have that connection to them as well. But we also wanted them to reflect back on their own objects, on why we keep things, if we have precious objects, whatever they might be, and if we collect things. The journey became a kind of story. We went back into the past, almost like tripping through time, in wonderment. (...)

It was a branching story, with multiple choice, A or B, backwards and forwards. Then in the end, you were asked to record something about an object that's precious to you. You're asked, as you go around, at a certain point, to feel if there's an object in your

pocket, and if not, to imagine holding a special thing in your hand and describe it on the phone.

SR: Museums have audio guides and tours, so it can be said that you were engaging with that existing format, but in a more playful, game-like way.

JRF: Yes. When we make work, we're aware of the existing culture. All that history of culture that's in museums, with tour guides, and of course, increasingly, there is fantastic interactive work in museums, for very good reason. But we are nervous, sometimes, of falling into an existing pattern, and of people going, "oh, that's just a tour guide". Not because we're anti-tour guides, but we know that the work isn't just sitting within that history of existing tour guides. We don't just want it to be your relationship to the object, but also to the idea of objects, the idea of collecting. We want you to think about the past, to think about yourself and your stuff in the future. We want to expand away from that tradition of tour guides. So yes, we are playing with that idea, and it is game-like.

When we walked around the museum with the curators, they talked about the story, or the narrative of the journey through the spaces. We walked around with them a lot, and it was interesting to see what sparkled for them. But for us, it felt like there was an opportunity, a chance to push another wedge in and open up what a tour could be. (...)

SR: How did people react to the work?

JRF: It was very interesting. People found it fun, because they were being told where to go, but in a surprising way. The navigation, or the route, wasn't linear in the way that they might expect, so people found it fun and curious. Their eyes and attention were drawn to things that they perhaps wouldn't notice, and to the possible connections between those things. It was something that you could do on your own phone, so people felt like they could do it on their own pace, in their own way. They didn't have a device that was given to them, unless they took a phone from the desk, so they could do it whenever they wanted, they could stop whenever they wanted. It was within their control. I think on the whole people really enjoyed it, that they found the playfulness quite fun and curious. They would tell other people about it and would also make their own stories about it afterwards. (...)

Interview with Ju Row Farr from Blast Theory, 8 June 2016, Brighton. The artist talks about the relationship between Blast Theory's work and games, and how *Ghostwriter* took the structure of audioguides and enhanced it with game elements, storytelling and agency.

"There are very clear boundaries within games, which can give people a route through the work, when that work isn't definitely a live event, or definitely a performance. If it's hard to categorise what it is, the structure of having a name, a goal, and having to do certain things to get to that goal, gives people a line to follow in the work. (...) We put people in that position where you can play a game in lots of different ways, or you can watch the game being played whilst you're still inside it. That agency for audiences, or participants, or users, feels more contemporary and relevant today than sitting in a theatre."

"*Ghostwriter* is about what it means to interact with history through objects."

"Suddenly we had a connection to these things, and we wanted people to go on journeys to have that connection to them as well. But we also wanted them to reflect back on their own objects, on why we keep things, if we have precious objects, whatever they might be, and if we collect things. The journey became a kind of story. We went back into the past, almost like tripping through time, in wonderment. (...)

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Appendix A.4.4. Excerpts from interviews with Matt Adams from Blast Theory during the author's research residency in Brighton

Excerpt from interview with Matt Adams (Blast Theory)

8 June 2016, Brighton

SR: (...) A lot of Blast Theory's work consists of experiences that can be described as game-like. Are you consciously influenced by games when you create experiences?

MA: Yes. I grew up playing games, from the age of twelve or thirteen. I played computer games on things like the ZX-Spectrum, which must have been in the early eighties. I always really enjoyed playing computer games, so when we first got a computer, a *fully-featured* Mac in 1992. I played games on it from the very beginning, things like *SimCity* and a game called *Marathon*. What I gradually realised is that computer games are a cultural form, and have every bit of richness, as an expressive medium, as more established media, like film, theatre, or visual art. This has become, of course, less and less controversial, but it was a minority view in the late nineties. There was already a very interesting games culture around, but producing games was incredibly difficult, and generally involved people knowing advanced coding languages. Things really changed for us when, in 1997, we met the University of Nottingham and the Mixed Reality Lab. They were making virtual worlds, and for the first time we began looking at three dimensional landscapes that you could explore, and we started building those landscapes, building experiences inside those virtual worlds. *Desert Rain*, in 1999, was the first time we ever made a game. I think the penny dropped at a certain moment as we were doing it: we are making a computer game, this is a game. What was fascinating was that it was a call to action for an audience, it was immediately clear to everyone what it was. As soon as we said it was a game, people were like, "oh, okay, cool, how do I play?" Before that, when people asked what we did, we would say interactive performance, using all these slightly convoluted, slightly avant-garde terms, terms that came freighted with a whole set of meanings and barriers to a lot of people, who had no idea what that was. (...)

SR: Moving on to *Ghostwriter*. Can you tell me a bit about the project, the experience, and what you hoped to achieve with it?

MA: *Ghostwriter* was a commission for the Royal Albert Memorial Museum. We were approached by a cultural consultant who they had brought in to help them develop a

digital strategy around the building. We wanted to think of an experience that would enable visitors to the museum to see the collection in a different way. We visited the museum while it was still empty, while the building works were still going on. All the collection was in storage through most of the period. It felt very interesting to us that a phone call, and being on the phone to someone while you walk around, is a very natural, easy way to occupy any space. The idea that you might be on the phone to a fictional character who's talking to you about the room you're in felt really powerful and light, in the same breath. Something that was easy to implement, and easy for an audience member to engage with, but that had the potential to re-frame and change the way they saw the museum.

From that, we started to write narratives in different voices, in different tones. Ju [Row Far], Nick [Tanderson], and I all wrote elements of scripts, and we sometimes fused them, and other times left them separate. Sometimes we wrote them in our own voice, and sometimes in a fictional voice. I wrote a few of them in my mother's voice, because we were thinking about objects, and the meaning of objects in people's lives. How can we bring your attention to this particular object that sits in an exhibit about slavery? Or to this particular piece of flint, which is handed chipped, and is tens of thousands of years old? We wanted to create stories that were set in the world of the museum that you were standing in, so it acknowledged the here and the now, the fact that you're standing in a museum and you're looking at an exhibit. But also, at times, it might suddenly shift, and talk about this room as if it was a living room of a house. It might refer to elements of the room that enable you to orientate yourself within it, but it's renaming things as other things. (...)

That's how the work is structured: it's a phone call. As you go into the museum's foyer, you ring a number, a woman answers the phone and starts talking to you as if she knows you. Then you use your keypad to say, I'm going to stay upstairs, or I'm going downstairs. It's a very simple branching narrative with a number of conjunctions between the stories and the objects in the rooms. (...)

SR: How did people react to the work?

MA: The great strength of it was that it caught people's attention, and it created an artistic experience in a place where people may not be expecting to find it. It drew people off into a world that they were not expecting to visit just a few minutes before.

And that's really powerful. The flipside of that was that some people were completely baffled, or challenged by what it was. It didn't behave by rules that people expected. Even ringing a phone number, most people don't associate that with a way of experiencing an artwork, so you have some people who feel that it doesn't belong in that setting, or it doesn't belong in that experience, and they can't link it together within that experience. But the culmination of the work was to make a recording about an object, and what we know about those recordings is: one, they stack up, you saw them coming in, and that's direct evidence of how people were engaging with the work all the way through. Secondly, the nature of those recordings is very beautiful, so you can tell that for some people it was really engaging, transporting them in very particular ways, and creating a link between their own history, their experience of objects, and the museum. The strapline for RAMM is "home to a million thoughts", so you have that sense of a constellation of thoughts and objects from all these different eras and settings, with all these different histories and purposes, and all the different hands that have touched them and handled them over millions of years. That's an amazing thing to think about in a museum, and my feeling is that is where the work took people.

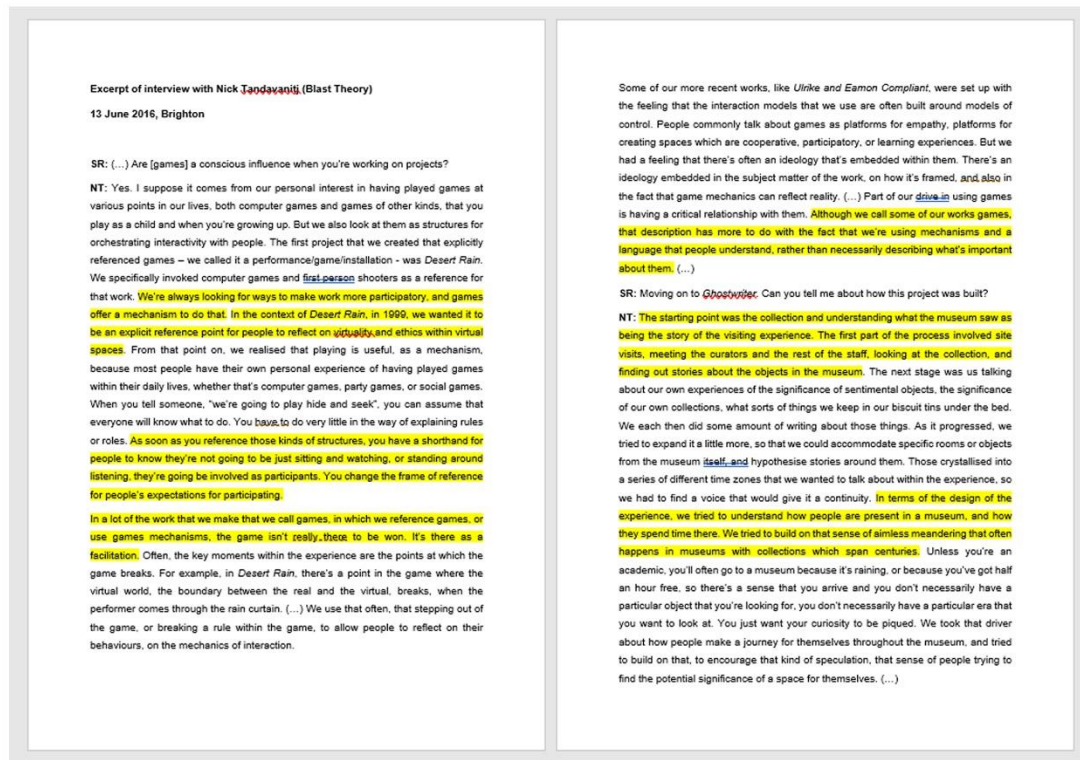
Excerpts from interview with Matt Adams from Blast Theory during the author's research residency in Brighton, 8 June 2016. The artist talks about the relationship of Blast Theory's work with games and about the aims of the *Ghostwriter* experience.

"[with *Ghostwriter*] We wanted to think of an experience that would enable visitors to the museum to see the collection in a different way."

"Something that was easy to implement, and easy for an audience member to engage with, but that had the potential to re-frame and change the way they saw the museum."

"(...) you can tell that for some people it was really engaging, transporting them in very particular ways, and creating a link between their own history, their experience of objects, and the museum."

Appendix A.4.5. Excerpts from interviews with Nick Tandavanitj from Blast Theory during the author's research residency in Brighton. Photos from interviews with Blast Theory and the author's desk in Brighton



Excerpts from interview with Nick Tandavanitj from Blast Theory during the author's research residency in Brighton, talking about the aims behind using game elements in their work, namely to frame the participants' role as more active. Photos from interviews with Blast Theory and the author's desk in Brighton.

"We're always looking for ways to make work more participatory, and games offer a mechanism to do that. In the context of Desert Rain, in 1999, we wanted it to be an explicit reference point for people to reflect on virtuality and ethics within virtual spaces."

"As soon as you reference those kinds of structures, you have a shorthand for people to know they're not going to be just sitting and watching, or standing around listening, they're going to be involved as participants. You change the frame of reference for people's expectations for participating."

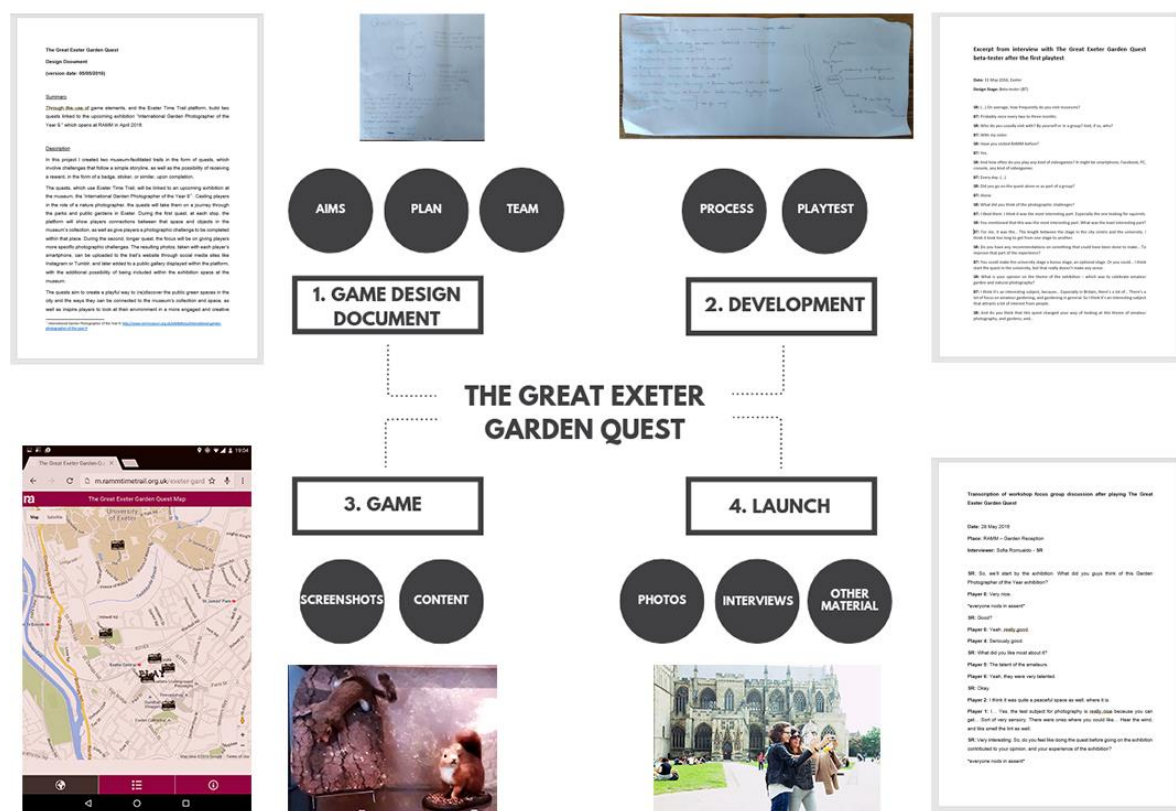
In a lot of the work that we make that we call games, in which we reference games, or use games mechanisms, the game isn't really there to be won. It's there as a facilitation."

"Although we call some of our works games, that description has more to do with the fact that we're using mechanisms and a language that people understand, rather than necessarily describing what's important about them."

"The starting point was the collection and understanding what the museum saw as being the story of the visiting experience. The first part of the process involved site visits, meeting the curators and the rest of the staff, looking at the collection, and finding out stories about the objects in the museum."

"In terms of the design of the experience, we tried to understand how people are present in a museum, and how they spend time there. We tried to build on that sense of aimless meandering that often happens in museums with collections which span centuries."

Appendix B. *The Great Exeter Garden Quest* – Game Design Process



Appendix B.1. Game Design Document

Appendix B.1.1. First version of the game design document for *The Great Exeter Garden Quest*

1. GAME DESIGN DOCUMENT

First version of the game design document for The Great Exeter Garden Quest, which includes a description of the experience, the aims, planned content, a timeline and the team involved.

<p>Exeter Gardens Quest Design Document (1) 9 March 2016</p> <p>Summary Through the use of game elements, and using the existing Exeter Time Trail platform, build a quest linked to the upcoming exhibition 'International Garden Photographer of the Year 9' which opens at RAMM in April 2016.</p> <p>Description Create a museum-facilitated trail in the form of a quest, which will involve challenges that follow a single storyline, as well as the possibility of receiving a reward, in the form of a badge, sticker, or similar, upon completion.</p> <p>The quest, which will be built on Exeter Time Trail, will be linked to an upcoming exhibition at the museum, the 'International Garden Photographer of the Year 9'. Casting players in the role of a nature photographer, the quest will take them on a journey through the parks and public gardens throughout Exeter. At each stop, the platform will show players connections between that space and objects in the museum's collection, as well as give players a photographic challenge to be completed within that place. The resulting photos, taken with each player's smartphone, can be uploaded to the trail's website through social media sites like Instagram or Tumblr, and later added to a public gallery displayed within the platform, with the additional possibility of being included within the exhibition space at the museum.</p> <p>The quest aims to create a playful way to rediscover the public green spaces in the city and the ways they can be connected to the museum's collection, and also inspire players to look at their environment in a deeper, more creative way. The International Garden Photographer of the Year initiative invites everyone, both amateur and professional photographers, to participate in the competition by contributing with their</p> <p><small>International Garden Photographer of the Year 9 http://www.rammmuseum.org.uk/ramm/exhibitions/international-garden-photographer-of-the-year-9/</small></p>	<p>own unique photographic perspective of natural landscapes, gardens, parks, and botanical specimens. By encouraging participants to explore the exhibition's theme in an engaging way, the quest will foster a different view and experience of the exhibition; players will no longer be passive consumers, but also active co-creators who contribute to the museum with their unique visions.</p> <p>Each player can select one of two roles: Explorer or Collector. Accordingly, on each stop, there will be two photographic challenges for players to choose from. The storyline and journey inside the quest, as well as potential challenges, will be created with the support of experts who are knowledgeable about the city parks and public gardens. The selection of collection objects to be included will be conducted with the assistance of the museum's curatorial team.</p> <p>The quest will first be tested in a workshop, with the participation of interested members of the museum community, and afterwards open to the general public. The workshop will also include a visit to the exhibition.</p> <p>Key characteristics</p> <ul style="list-style-type: none">• Puts players into a role as part of a story, increasing engagement through action-based roleplay.• Creates a personal and physical journey that can be done individually or in a group (some of the activities have further suggestions for those working in groups), adding an optional social aspect of team play to the quest.• Promotes learning about the museum's collection as part of an experience that doesn't specifically focus on education or interpretation. In videogames, this is sometimes called 'stealth learning': describing the things that players learn, sometimes without realising it, as they are playing.• Engaging experience on an intellectual, creative, and also physical level, since following the trail demands physical movement, and the challenges imply a degree of physical involvement with the player's surroundings.• Promotes the development of visual literacy by following photographic challenges, while still giving players a degree of choice and creativity in how to respond to them.	<ul style="list-style-type: none">• Expands / augments / incorporates the space of the museum, both physically and virtually, by bringing the collection outside the building, and by bringing the gardens to the museum, once the photos are uploaded and shown in the gallery.• Builds connections between the museum and the surrounding context of the city. <p>Places and Challenges (chosen for proximity to the museum)</p> <ol style="list-style-type: none">1. Start: RAMM2. Cathedral Green Choose one of the many views of the Cathedral from RAMM's free art collection. Challenge players to take a photograph of the green space with the Cathedral in the background.3. Bull Meadow Park Find a connection between the living creatures in the park (bird, butterfly, other insects) and those in RAMM's collection. Challenge players to capture one of these specimens in a photograph.4. Southcote Gardens Find a connection between the botanical specimens in the gardens (plants, flowers, trees) and those in RAMM's collection. Challenge players to capture one of these specimens in a photograph.5. Roopemount Gardens Find a connection between the Exeter War Memorial and one of the works in RAMM's collection related to World War I; alternatively, connect the Roman and Saxon walls in the collection. Challenge players to capture the play of light, shadows, and textures in a black and white photograph.7. University grounds (Batham Campus)
<p>Connection between Barbara Hepworth's sculpture in the university grounds, and the one in RAMM's collection. Challenge players to take a photo using the sculpture in a creative way (i.e. as a frame, as an abstract detail, from afar, etc.).</p> <p>8. Bury Meadow Park Find a connection between community recreation activities and objects in RAMM's collection. Challenge players to take a photograph that shows a human trace against the natural backdrop; this can be interpreted by them in many ways (the photo can include a body part, a human built structure, silhouettes, and so on).</p> <p>9. Faish's RAMM The last stop is visiting the 'International Photographer of the Year 9' exhibition at the museum.</p> <p>Technical requirements (beyond existing Time Trail features)</p> <ul style="list-style-type: none">• The ability for users to upload a response, to each stop in the trail, in the form of a photo, taken with their mobile phones or tablets. (Ideally, already allows this, does Exeter Time Trail allow it as well?)• Allowed photos should appear in a public gallery within the trail, so that participants can see how others before them have responded to challenges. This gallery could be based on services like Tumblr or Instagram. The photos should appear alongside the name of the photographer, and ideally be automatically tagged with #GOTY9.• The resulting photos may be shown within the exhibition, in a tablet or a similar device, so there should be a way to publicly view them outside the trail website. <p>Resources needed Workshop: space, staff, promotional materials.</p> <p>Budget</p>	<p>Refreshments for the workshop participants</p> <ul style="list-style-type: none">• Badges (both to identify players to facilitate observation, and to encourage them getting into role-play).• Rewards: stickers, postcards <p>Workshop Total time: 2 hours</p> <ul style="list-style-type: none">• Start with a briefing about the exhibition, the quest, and the research project. Ask participants to sign the consent form. (15 minutes)• Go on the quest as a group. (80-90 minutes)• Get refreshments at the museum. (15 minutes)• Visit the exhibition. (30 minutes) <p>Timeline Project length: approximately 3 months to completion. February to May 2016.</p> <p>Staff</p> <ul style="list-style-type: none">• Discuss the possibility of integrating players' photographs within Exeter Time Trail with the platform developers.• Create the quest with Exeter Time Trail: create the story, choose the places to include, the order through which they should be visited, the objects in RAMM's collection with which to make connections, and the photographic challenges to be completed by players. The quest should start and finish at the museum, and be able to be completed in approximately one hour.• Playtest the quest.	<p>After the exhibition opens (on April 2016), organize a free workshop. Participants will have to bring their own smartphones or tablets, preferably with an Internet connection, although it can also be possible to take photographs and upload them at home. Brief the players on the platform, the quest, the research that is being undertaken, and the exhibition. Lead the players on the quest around the city, and back to the museum, to get refreshments and visit the exhibition. The free visit will have the dual goal of training them for taking part in the <u>quest</u>, and allowing us to observe their reactions when visiting the exhibition.</p> <p>After twinning the platform, invite the general public to do the quest during the exhibition.</p> <p>Team</p> <ul style="list-style-type: none">Sofia RomualdoRick Lawrence <p>With contributions from the Collections Team at RAMM</p> <p>Exeter Time Trails was created by the University of Exeter and 1010 Media</p> <p>Links Exeter Time Trail: http://www.recomindmedia.co.uk/</p>

"The quest aims to create a playful way to rediscover the public green spaces in the city and the ways they can be connected to the museum's collection, and also inspire players to look at their environment in a deeper, more creative way."

"Puts players into a role as part of a story, increasing engagement through action-based roleplay."

"Creates a personal and physical journey that can be done individually or in a group (...)"

"Promotes learning about the museum's collection as part of an experience that doesn't specifically focus on education or interpretation."

"Engaging experience on an intellectual, creative, and also physical level, since following the trail demands physical movement, and the challenges imply a degree of physical involvement with the player's surroundings."

"Promotes the development of visual literacy by following photographic challenges, while still giving players a degree of choice and creativity in how to respond to them."

"Expands / augments / incorporates the space of the museum, both physically and virtually, by bringing the collection outside the building, and by bringing the gardens to the museum, once the photos are uploaded and shown in the gallery."

"Builds connections between the museum and the surrounding context of the city."

Team:

Sofia Romualdo


Rick Lawrence

With contributions from the Collections Team at RAMM

Exeter Time Trails was created by the University of Exeter and 1010 Media [see main text for a list of credits]

Appendix B.1.2. Excerpts from the later version of the game design document for *The Great Exeter Garden Quest*

Excerpts from the later version of the game design document for The Great Exeter Garden Quest, which includes a more detailed description of the experience (including the plan for a second version of the quest, which was later abandoned due to time constraints), the textual and visual content of the quest (which includes an introduction to the quest, directions to places, and the challenges that players can complete), and a more detailed timeline. These changes reflect the iterative process of game design and the evolving nature of the game design document.

<p>The Great Exeter Garden Quest</p> <p>Design Document</p> <p>(version date: 05/05/2016)</p> <p>Summary:</p> <p>Through the use of game elements, and the Exeter Time Trail platform, build two quests linked to the upcoming exhibition 'International Garden Photographer of the Year 9' which opens at RAMM in April 2016.</p> <p>Description:</p> <p>In this project I created two museum-facilitated trails in the form of quests, which involve challenges that follow a simple storyline, as well as the possibility of receiving a reward, in the form of a badge, sticker, or similar, upon completion.</p> <p>The quests, which use Exeter Time Trail, will be linked to an upcoming exhibition at the museum, the 'International Garden Photographer of the Year 9'. Casting players in the role of a nature photographer, the quests will take them on a journey through the parks and public gardens in Exeter. During the first quest, at each stop, the platform will show players connections between that space and objects in the museum's collection, as well as give players a photographic challenge to be completed within that place. During the second, longer quest, the focus will be on giving players more specific photographic challenges. The resulting photos, taken with each player's smartphone, can be uploaded to the trail's website through social media sites like Instagram or Tumblr, and later added to a public gallery displayed within the platform, with the additional possibility of being included within the exhibition space at the museum.</p> <p>The quests aim to create a playful way to (re)discover the public green spaces in the city and the ways they can be connected to the museum's collection and space, as well as inspire players to look at their environment in a more engaged and creative way.</p> <p>International Garden Photographer of the Year 9: http://www.exeter.gov.uk/what-to-do/exhibitions/international-garden-photographer-of-the-year-9</p>	<p>way. The International Garden Photographer of the Year initiative invites everyone, both amateur and professional photographers, to participate in the competition by contributing with their own unique photographic perspective of natural landscapes, gardens, parks, and botanical specimens. By encouraging participants to explore the exhibition's theme in an appealing way, the quests will foster a different view and experience of the exhibition. Players will no longer be passive consumers of the exhibition's content, but also active co-creators who contribute to the museum with their own unique vision of the theme.</p> <p>Each player can select one of two roles, according to their particular preferences: Collector or Explorer. The plan is for there to be two quests, one for each of these roles, which will be based on the same theme and includes some of the same places, but vary in terms of duration, number of stops, and challenges to the player. The storyline and journey inside the quests, as well as potential challenges, will be created with the support of experts who are knowledgeable about the city parks and public gardens. The selection of collection objects to be included will be conducted with the assistance of the museum's curatorial team.</p> <p>The quest will first be tested by the developing team, and later in a workshop, with the participation of interested members of the museum community. The workshop will also include a visit to the exhibition. After an iterative development process, the quests will be open to the general public.</p> <p>Key Project Characteristics</p> <p>Put players into a role as part of a story, increasing engagement through action-based roleplay.</p> <p>Creates a personal and physical journey that can be done individually or in a group (some of the activities have further suggestions for those working in groups), adding an optional social aspect of team play to the quest.</p> <p>Promotes learning about the museum's collection as part of an experience that doesn't specifically focus on education or interpretation. In videogames, this is sometimes called 'stealth learning', describing the things that players learn, sometimes without realising it, as they are playing.</p>	<p>Engaging experience on an intellectual, creative, and also physical level, since following the trail demands physical movement, and the challenges imply a degree of physical involvement with the player's surroundings.</p> <p>Promotes the development of visual literacy by following photographic challenges, while still giving players a degree of choice and creativity in how to respond to them.</p> <p>Expands / augments / incorporates the space of the museum, both physically and virtually, by bringing the collection outside the building, and by bringing the gardens to the museum, once the photos are uploaded and shown in the gallery.</p> <p>Builds connections between the museum and the surrounding context of the city.</p> <p>Inspired by game design, the project includes <i>gameified</i> challenges, tailored for players with different skill levels: there are two quests of differing difficulty, an entry-level one, for beginners, and a more challenging one, for more expert players, who have completed the first quest and are looking for a bigger challenge.</p> <p>Quest Tests</p> <p>Each quest's description will start with a short introduction to the story. Following that, there will be questions designed to let the player decide which quest to undertake, for example, "Are you more interested in objects, or in exploring every nook and cranny in the world around you?" The player can then decide to continue on to the first challenge of the quest they have selected, or follow a link to the alternate quest (links will be added once both quests are online). This introductory text will be the same for both quests, with only a phrase added to each description to indicate which quest the player is currently on.</p> <p>The language used is purposefully playful, simple, and clear, addressing the player directly to give a sense of personalised direction. The descriptions are perhaps longer and more verbose than usual for writing on the web; however, due to the nature of the quest, I believe that the experience has a lot to gain from giving the text a slightly whimsical storytelling character, while keeping it short enough that it will not be boring to read on the go.</p>
<p>Introduction</p> <p>Welcome, traveller!</p> <p>You are an adventurous photographer, on a quest to discover Exeter's green spaces and the secrets they hold in plain sight. During your journey, you will uncover clues to the origin of the city's gardens and parks, as well as discover the connections they hold with objects from the collection of the Royal Albert Memorial Museum and Art Gallery, Exeter's repository of cultural treasures. Along the way, you will be asked to look at your surroundings with a photographer's eye, to uncover patterns and details hidden to those who do not look closely enough. On each stop along the quest, there will be a photographic challenge, which you can complete using your smartphone or tablet's camera. The results of your unique way of looking will be exhibited alongside the photographs at the "International Garden Photographer of the Year 9" exhibition at RAMM. What will your interpretation be?</p> <p>You can choose between two quests:</p> <p>Collector's Quest: Are you someone who likes to pay attention to details? Do you prefer to take your time in a specific place, looking up every colour and shape, and discovering the secrets hidden in common scenes? If so, the Collector's Quest may be for you. Of the two quests, this one has the fastest path to completion, taking approximately one hour and fifteen minutes. You will be introduced to objects from the museum's collection and asked to complete challenges, inspired by those artefacts, during which you will collect specific visual scenes from each stop, creating a group of photographs that will reflect your own unique and personal vision.</p> <p>Explorer's Quest: Do you have a wanderer's spirit? Do you find, from time to time, your feet itching to hit the road and see the world? Do you enjoy exploring every nook and cranny in the world around you? If so, you may prefer the Explorer's Quest. This longer path will take you on a three-hour long journey through all of Exeter's major public parks and gardens. By the end of it, you will not only develop a unique and comprehensive photographic vision of the city's green spaces, you will also become an expert explorer of the city itself.</p> <p>Quest 1 – The Collector's Quest</p>	<p>3. Rougemont Gardens</p>  <p>Grey (<i>Sciurus capreolus</i>), from Exeter) and red (<i>Sciurus vulgaris</i>, British, from the collection of Miss Lethbridge of Launceston, Cornwall) squirrels, on view at RAMM.</p> <p>It's time to backtrack your steps, back to your point of entrance to the Cathedral Cloak, and walk towards the Doccabury area. While there, resist the temptation to stop for a quick shopping spree, and turn left towards High Street. Eventually, on your left side, you will find McQuay's Coffee Shop, and the Post & Manger opposite that; the street between them is the one to which you must venture to next. Keep walking up Castle Street, paying attention to your left-hand side, until you see the stone archways that mark the entrance to Rougemont Gardens.</p> <p>The most distinct feature of Rougemont Gardens is its great grassy ditch, a remnant of the area's wartime past. Converted to a garden during the 18th century, the ditch was an important part of the defence capabilities of Rougemont Castle, which was built nearly one thousand years ago by William the Conqueror, during the Norman conquest of England. The garden is now a public space well loved by the city's residents, as well as by the more permanent residents in the gardens: the squirrels. While the native species to Devon, the red squirrel, is now rarely seen, the grey squirrel, who came from North America, is a common sight in Exeter's green spaces. The museum has a specimen of each species on exhibition.</p>	<p>Badges, both to identify players to facilitate observation, and to encourage them getting into role-play.</p> <p>Rewards: stickers or postcards.</p> <p>Workshop</p> <p>Total time: 2 hours</p> <ul style="list-style-type: none">Start with a briefing about the exhibition, the quest, and the research project. Ask participants to sign the consent form. (15 minutes)Go on the Collector's quest as a group. (60-80 minutes)Get refreshments at the museum. (15 minutes)Visit the exhibition (30 minutes) <p>Project Timeline</p> <p>Project length: approximately 3 months to completion.</p> <p>February to May 2016:</p> <p>February - March 2016</p> <ul style="list-style-type: none">Discuss the possibility of integrating players' photographs within Exeter Time Trail with the platform developers.Create the quests with Exeter Time Trail: create the story, choose the places to include, the order through which they should be visited, the objects in RAMM's collection with which to make connections, and the photographic challenges to be completed by players. <p>March - April 2016</p> <ul style="list-style-type: none">Playtest the quest, and make any necessary changes.

Introductory text for the Quest:

"You are an adventurous photographer, on a quest to discover Exeter's green spaces and the secrets they hold in plain sight. During your journey, you will uncover clues to the origin of the city's gardens and parks, as well as discover the connections they hold with objects from the collection of the Royal Albert Memorial Museum and Art Gallery, Exeter's repository of cultural treasures. Along the way, you will be asked to look at your surroundings with a photographer's eye, to uncover patterns and details hidden to those who do not look closely enough.

On each stop along the quest, there will be a photographic challenge, which you can complete using your smartphone or tablet's camera. The results of your unique way of looking will be exhibited alongside the photographs at the "International Garden Photographer of the Year 9" exhibition at RAMM.

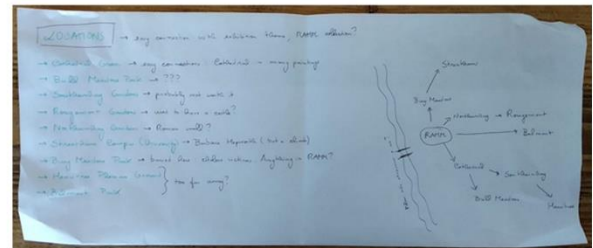
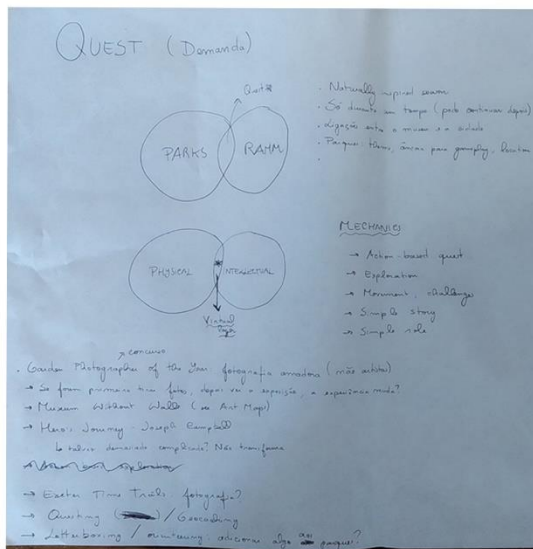
What will your interpretation be?"

Appendix B.2. Development

Appendix B.2.1. Documentation of the development process of *The Great Exeter Garden Quest*. Excerpts of notes on design by the author

2. DEVELOPMENT

Documentation of the development process of *The Great Exeter Garden Quest*, including excerpts of notes on design by the author, photos and playtesting notes. These notes show the thought process behind the game design.



"The difficulty of the photographic challenges should be incremental, to give a sense of progression and building players' abilities upon previous challenges."

"Maybe the platform I'm using is not the most adequate to create quests, but I also find it important to build upon existing tools in order to maximize resources, so that's one of the defining factors in the design."

"Study RAMM's collection (specially the objects that are being exhibited) to find links that can be made with gardens and parks. It can be just an animal (bird or insect) that can be found in certain flowers or plants, a depiction of a place, flower, plant or animal, an explorer, a collector, even a colour or texture."

"Stress the importance of the player bringing their own unique vision to the contributions."

Two trails? One for Explorers and one for Collectors? Select different gardens then. Or maybe one short (Collectors) and one long (Explorers). Start with the short one and see if I need the other.

Will participants be able to follow the trail, take the photographs and upload them later? For example, if they would prefer using a better camera and editing the images on the computer. Or should we limit it to in-situ, mobile use?

Should I apply the theory of 'trajectories through interpretation'?

Is there any way that we can associate the photos with a given user? Do they have to register, or can we just track the device that's being used? Privacy?

Take a selfie against a garden background. It doesn't have to show your face, it can be just a body part (like your feet).

What other photographic challenges should we create? Where should I go for inspiration? Shall I talk to the exhibition curators, the jury, look at catalogues from past exhibitions by the same competition?

How can I flesh out the story more?

If they're going on a quest, the player must "earn" something by the end of it. What can this "something" be?

The difficulty of the photographic challenges should be incremental, to give a sense of progression and building players' abilities upon previous challenges.

Maybe the platform I'm using is not the most adequate to create quests, but I also find it important to build upon existing tools in order to maximize resources, so that's one of the defining factors in the design.

We do not necessarily have to conduct this before the exhibition starts. It can actually be during the exhibition, and we can offer entry to the exhibition for free to participants as part of the experience.

Study RAMM's collection (specially the objects that are being exhibited) to find links that can be made with gardens and parks. It can be just an animal (bird or insect) that can be found in certain flowers or plants, a depiction of a place, flower, plant or animal, an explorer, a collector, even a colour or texture.

Stress the importance of the player bringing their own unique vision to the contributions.

Money can be used for: food and drink, badges, stickers, or other rewards.

Indicate accessibility and physical difficulty.

To Do:

[x] Calculate how much time will be spent on each stop (reading, responding to challenges, uploading) 5-10 minutes on each stop

[x] Decide how many stops and which ones

[x] Organize them through a logical order

[x] Two paths: Explorer and Collector (maybe solo and group quest, although that won't really work with uploading the photos)

[x] Go to each park / garden and take photos

[x] Go to the museum and find potential objects; photograph them

Characteristics:

. Puts players into a role as part of a story

. Personal journey that can be done individually or in a group (some of the activities have further suggestions for those working in groups), adding an optional social aspect of team play to it.

. Learning about the museum's collection as part of an experience that doesn't specifically focus on education or interpretation (stealth learning, as in videogames).

. Engaging intellectually, and also physically; the trail demands physical movement, but also the challenges imply a degree of physical involvement with the player's surroundings.

. Develop visual literacy by following challenges, while still maintaining a degree of choice and creativity in how to respond to them.

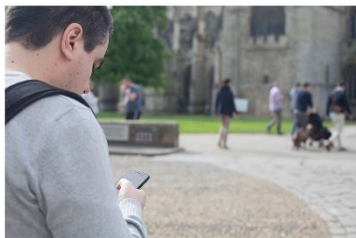
Appendix B.2.2. Excerpt from interview and photos from the first external playtest

Excerpt from interview with The Great Exeter Garden Quest beta-tester after the first playtest

Date: 11 May 2016, Exeter
Design Stage: Beta-tester (BT)

SR: (...) On average, how frequently do you visit museums?
BT: Probably once every two to three months.
SR: Who do you usually visit with? By yourself or in a group? And, if so, who?
BT: With my sister.
SR: Have you visited RAMM before?
BT: Yes.
SR: And how often do you play any kind of videogames? It might be smartphone, Facebook, PC, console, any kind of videogames.
BT: Every day. (...)
SR: Did you go on the quest alone or as part of a group?
BT: Alone.
SR: What did you think of the photographic challenges?
BT: I liked them. I think it was the most interesting part. Especially the one looking for squirrels.
SR: You mentioned that this was the most interesting part. What was the least interesting part?
BT: For me, it was the... The length between the stage in the city centre and the university. I think it took too long to get from one stage to another.
SR: Do you have any recommendations on something that could have been done to make... To improve that part of the experience?
BT: You could make the university stage a bonus stage, an optional stage. Or you could... I think start the quest in the university, but that really doesn't make any sense.
SR: What is your opinion on the theme of the exhibition – which was to celebrate amateur garden and natural photography?
BT: I think it's an interesting subject, because... Especially in Britain, there's a lot of... There's a lot of focus on amateur gardening, and gardening in general. So I think it's an interesting subject that attracts a lot of interest from people.
SR: And do you think that this quest changed your way of looking at this theme of amateur photography, and gardens, and...

BT: Yeah, I think so.
SR: How so?
BT: It highlighted my interest in taking photographs, especially of nature subjects, and nature theme-based photography.
SR: Do you feel that the last time that you came to the museum before this one, and this time... Did you feel there was any difference?
BT: Yeah, because... When you see an exhibition that is only an exhibition, I think it's not... it's like watching television. You are passively receiving, you are passively consuming the exhibition. When you have something to do, you are interacting with the exhibition. So I think that, in a way, it's better.
SR: So, do you feel like this game made you feel like you could do something that you don't usually do? Both in the city and in the museum?
BT: Yeah. I think people don't seldom visit all the major gardens in the city, and I think it was an opportunity to visit all of them.
SR: Do you feel like it changed the sense of place that you feel, felt in the city and in the museum? Do you feel that it changed the way you reacted to the space, and interpreted the space of the city and the museum?
BT: I think so, yeah.
SR: How so?
BT: I don't know, it made me appreciate more the green spaces around the city. To... I don't know, to find something that I haven't found before, like the Roman wall, or something like that. That one specific part that I hadn't seen before, or something like that.
SR: Do you feel that adding a game dimension to this kind of museum-going experience, do you think that it improves the experience of going to a museum?
BT: Yeah, I think so. (...)



Excerpt from interview and photos from the first external playtest in which the author followed one participant while they were playing. The feedback shows how playtesting helps the iterative process of design, as it led to the adaptation of one of the challenges as a bonus level.

"[the least interesting part was] the length between the stage in the city centre and the university. I think it took too long to get from one stage to another."

"You could make the university stage a bonus stage, an optional stage. Or you could... I think start the quest in the university, but that really doesn't make any sense."

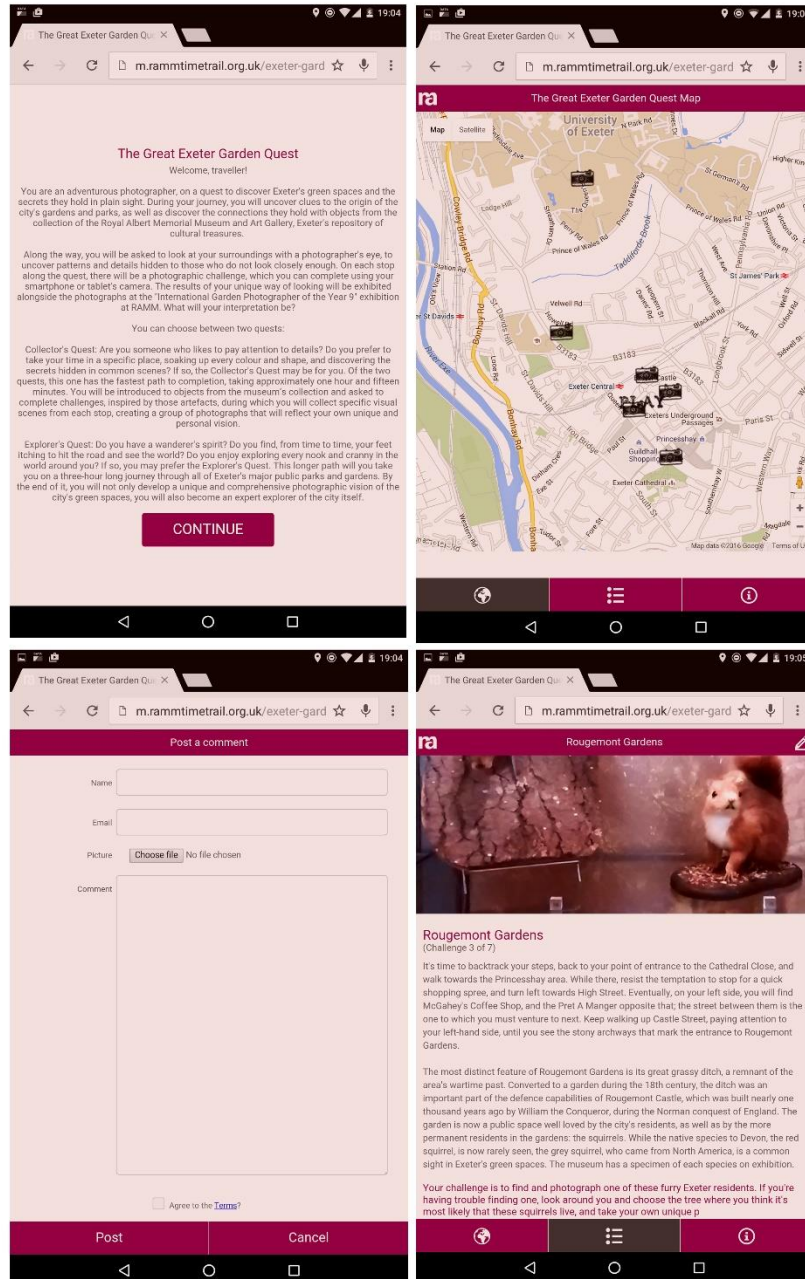
"It highlighted my interest in taking photographs, especially of nature subjects, and nature theme-based photography."

"When you see an exhibition that is only an exhibition, I think it's not... It's like watching television. You are passively receiving, you are passively consuming the exhibition. When you have something to do, you are interacting with the exhibition. So I think that, in a way, it's better."

Appendix B.3. Game - Screenshots and text excerpts of the final version of *The Great Exeter Garden Quest*

3. GAME

Screenshots and text excerpts of the final version of The Great Exeter Garden Quest, showing the interface that the players interact with during the game.



“3. Rougemont Gardens

It's time to backtrack your steps, back to your point of entrance to the Cathedral Close, and walk towards the Princesshay area. While there, resist the temptation to stop for a quick shopping spree, and turn left towards High Street. Eventually, on your left side, you will find McGahey's Coffee Shop, and the Pret A Manger opposite that; the street between them is the one to which you must venture to next. Keep walking up Castle Street, paying attention to your left-hand side, until you see the stony archways that mark the entrance to Rougemont Gardens. The most distinct feature of Rougemont Gardens is its great grassy ditch, a remnant of the area's wartime past. Converted to a garden during the 18th century, the ditch was an important part of the defence capabilities of Rougemont Castle, which was built nearly one thousand years ago by William the Conqueror, during the Norman conquest of England. The garden is now a public space well loved by the city's residents, as well as by the more permanent residents in the gardens: the squirrels. While the native species to Devon, the red squirrel, is now rarely seen, the grey squirrel, who came from North America, is a common sight in Exeter's green spaces. The museum has a specimen of each species on exhibition.

Your challenge is to find and photograph one of these furry Exeter residents. If you're having trouble finding one, look around you and take a photo of the tree where you think it's most likely that these squirrels live.”

Appendix B.4. Launch

Appendix B.4.1. Photos of players during the launch of *The Great Exeter Garden Quest*

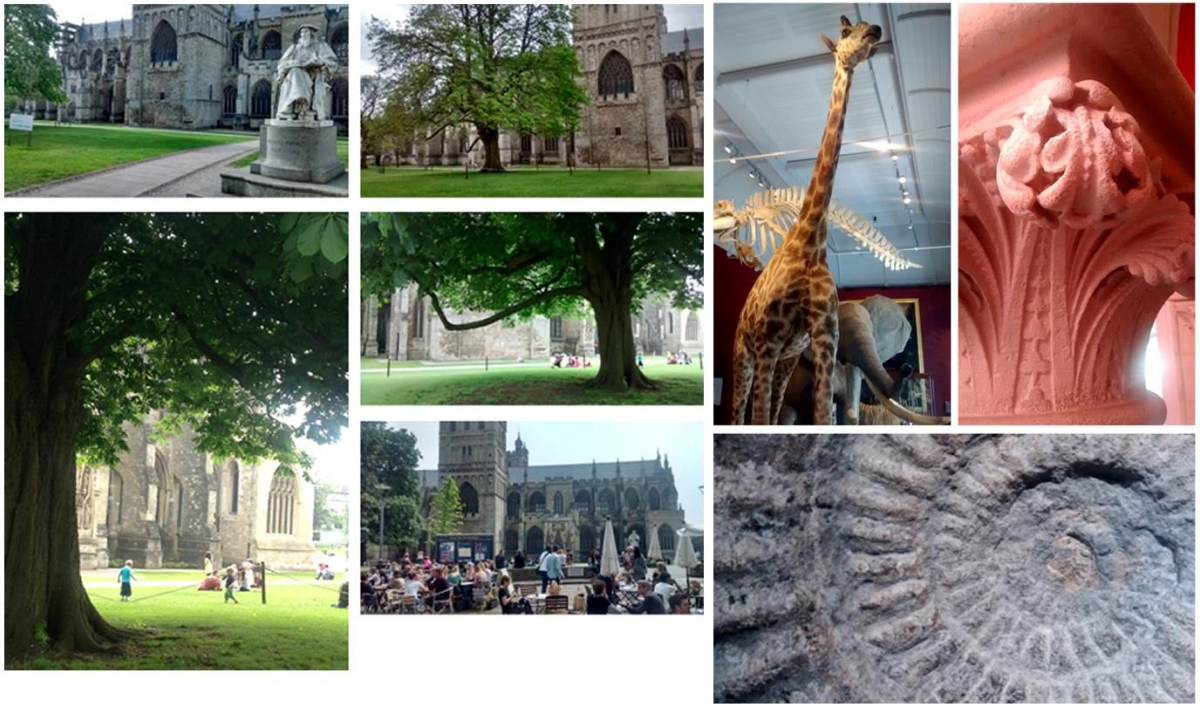
4. LAUNCH

Photos of and contributed by players during the launch of The Great Exeter Garden Quest, excerpts of focus group interview after the launch, and examples of promotional materials for the quest.



Photos of players during the launch of The Great Exeter Garden Quest, 28 May 2016, showing players reading challenges in the app, working on challenges, and interacting with one another while in the Exeter city parks and inside RAMM.

Appendix B.4.2. Examples of images contributed by players during *The Great Exeter Garden Quest* (first and final challenges)



Examples of images contributed by players during The Great Exeter Garden Quest (first and final challenges), showing the different ways that players interpreted the challenges - in this case, taking a photo of the cathedral without it being in the foreground, and taking a nature-inspired photo inside the museum.

Appendix B.4.3. Author's notes on players and technology during *The Great Exeter Garden Quest* launch

Author's notes on players and technology during The Great Exeter Garden Quest launch / workshop

28 May 2016

Prior to moving out of the museum, players seemed curious about the app, but were also looking around the space.

A typical gameplay action:

- . Looking at screen together
- . Reading aloud
- . Looking around
- . Wayfinding, chatting and looking around as they do so
- . Arrive at the correct place
- . Look at screen again, read
- . Separate to find something to photograph
- . Get together again to show other player
- . Repeat until satisfied with the result
- . Upload photo
- . Wait for photo to appear in the website

Players spent considerably more time in the squirrel challenge than in other challenges. The two male friends looked around and, not immediately seeing squirrels, quickly decided to find a tree instead to fulfill the alternate challenge, while the two females walked extensively to the other side of the park, away from where most people were, to try to find a squirrel. The couple climbed the moat's side amidst the plants in order to get closer to where squirrels live.

Social dynamics: pair of female friends who used only one phone, really collaborated on what they should do, read the text together, commented on the info, discussed the

challenge, debated on the best way to fulfill it, took turns taking photos, showed each other, studied other people's photos

. pair of male friends who used only one phone, who walked together but didn't discuss much, passed the phone from one to the other, and had one of them fulfill all the challenges with only nods of approval or short comments from the other

. couple, male and female, who both used their own phones, but who read together, discussed the challenges, then got separate to take photos, then got together again to show each other, give and get feedback, and try again).

The male in this couple was really concerned with repeating the photos until it got to what he wanted, while most of the other players were satisfied with their first try. The couple explored more in each place than the other players, walking around the park until they could find a place to fulfill the challenge, while other players mostly stayed in the places where the quest directed them to. The couple were also more proactive, at one time asking a bystander if they could take a portrait of her for the challenge. They also tended to take and upload more than one photo at each stop, while other players were satisfied with contributing one photo and moving on.

All seemed to treat the quest as a social occasion, an opportunity to go outside and enjoy the weather and the surroundings, many of which they weren't familiar with, despite having lived in the city for a long time.

The pair of female friends, while making their way to the first stop, in the midst of weekend crowds of shoppers and visitors, commented "This is really fun! It's like we're playing a game in the middle of all these people, in the city."

While visiting the exhibition, players stayed in pairs. Many commented with each other how amazed they were at the skill of the amateur photographers featured. Two of the players (the artist and one of the male friends) commented that they would like to participate in the competition one day, remarking that the barrier to entry would be the technology available to produce images (most of the photos on view were created with SLRs).

Players also tended to talk to each other whenever they had trouble with the technology, to try to solve the problem collaboratively.

While walking from one challenge to the other, players focused on written directions, instead of looking at the map to see where the next location would be. This was deliberate on the part of design, which focused on space and following directions grounded on specific landmarks as part of the quest.

Viewing the exhibition: Lots of exclamations about how good the photos are. Spend some time on each photo, talking about the techniques and theme with other players. A player jokingly mentioned how bad their own photos were in comparison, saying they wish they had a DSLR instead of a phone camera. Players seemed to be in a good mood and energetic.

Bugs

- . There was a player with a Nokia smartphone who had a problem: trail can be accessed, but the first screen locks and it's impossible to scroll down, so they cannot start it at all.
- . Another player with a Samsung Galaxy X5 came across some problems: sometimes the photo wouldn't upload and would be lost (because no photo was saved to the phone's camera when it was accessed through the trail); one time the photo uploaded but now shows up as a black rectangle; and by the end, every time she tried to upload she got the message "Unable to complete previous operation due to low memory", and got sent back to Time Trails' homepage - even though the phone said it had plenty of free memory.
- . Most phones don't give the option of either taking a new photo or selecting one from the phone's memory - clicking on "Choose file" automatically takes players to their camera, without any option to select a photo already taken. Having both options available would be useful.
- . Players also asked if there could be a way for the phone to save the player's name, email, and the fact that he/she has agreed to the Terms & Conditions, so that they don't have to keep doing it every time they try to upload a photo. Not sure if this would be possible though?

Author's notes on players and technology during The Great Exeter Garden Quest launch, showing evidence of the players' behaviour during gameplay, social interactions, reactions when visiting the museum and initial feedback about the quest.

"The pair of female friends, while making their way to the first stop, in the midst of weekend crowds of shoppers and visitors, commented "This is really fun! It's like we're playing a game in the middle of all these people, in the city."

"While walking from one challenge to the other, players focused on written directions, instead of looking at the map to see where the next location would be. This was deliberate on the part of design, which focused on space and following directions grounded on specific landmarks as part of the quest."

"Viewing the exhibition: Lots of exclamations about how good the photos are. Spend some time on each photo, talking about the techniques and theme with other players. A player jokingly mentioned how bad their own photos were in comparison, saying they wish they had a DSLR instead of a phone camera. Players seemed to be in a good mood and energetic"

Appendix B.4.4. Excerpts from focus group discussion after launching and playing *The Great Exeter Garden Quest*

<p>Transcription of workshop focus group discussion after playing The Great Exeter Garden Quest</p> <p>Date: 28 May 2010</p> <p>Place: RAMM – Garden Reception</p> <p>Interviewer: Sofia Ronvaldo - SR</p> <p>SR: So, we'll start by the exhibition. What did you guys think of this Garden Photographer of the Year exhibition?</p> <p>Player 6: Very nice.</p> <p>"everyone nods in assent"</p> <p>SR: Good?</p> <p>Player 6: Yeah, really good.</p> <p>Player 4: Seriously good.</p> <p>SR: What did you like most about it?</p> <p>Player 5: The talent of the amateurs.</p> <p>Player 6: Yeah, they were very talented.</p> <p>SR: Okay.</p> <p>Player 2: I think it was quite a peaceful space as well, where it is.</p> <p>Player 1: I... Yes, the best subject for photography is really close because you can get... Sort of very sensory. There were ones where you could like... Hear the wind, and like smell the air as well.</p> <p>SR: Very interesting. So, do you feel like doing the quest before going on the exhibition contributed to your opinion, and your experience of the exhibition?</p> <p>"everyone nods in assent"</p>	<p>Player 3: I think it probably gives you a bit of context on how hard it might be to get such great photos.</p> <p>Player 4: Yeah.</p> <p>Player 3: When you're... You've just shortly before tried yourself to take a photo. So I think it's interesting to go from trying yourself to seeing some really great examples of people doing that.</p> <p>Player 2: Yeah, I think I also feel like I wouldn't necessarily be very connected to... I'd look and think that they were all experts, but actually having tried it first did for me, make me feel like I was more linked into it. So, yeah... Closed the distance.</p> <p>Player 1: Yes, because it sets up your minds to... To see that way as well. Yeah.</p> <p>SR (to players 5 and 6): What did you guys think?</p> <p>Player 6: Yeah, I was going to say that. I think it put us... Put me in the mood to kind of, like, experience better.</p> <p>Player 4: It was quite inspiring, as well.</p> <p>Player 5: Yes.</p> <p>Player 4: You know? Having done it yourself, and then you see that, and you're like, well, these are people... They can do it, cool. They're amateurs too.</p> <p>SR: So, if you think about the last exhibition before... That you visited before this one, and the exhibition now, do you think that it was different? Going to the last exhibition that you went and today, did you feel like you looked at things differently?</p> <p>Player 6: Don't remember which was the last exhibition I went to.</p> <p>Player 5: You mean here in this museum?</p> <p>SR: No, I mean any exhibition, in general. The last that you went, did you feel like this connection...</p> <p>Player 4: Yeah, because you've had a taste of how it works. You get an idea of the skill that's involved. You know? I took the pictures of naff, and you see these and you go, wow, that's... That's actually... It's not just point and click, it's this skill. I think that's very good compared to previous exhibitions I've been to, where I've looked around</p>	<p>and go, that's very nice, that's a nice painting. But you're sort of distanced from it. So yeah.</p> <p>SR: From the way you make what you are seeing?</p> <p>Player 4: Yeah, yeah.</p> <p>Player 1: The last one we went to was a...</p> <p>Player 2: The last one we went to, I've been to more, "laughter" Well, I do go to a museum every week.</p> <p>Player 1: It was this really big teddy bear museum in Dorchester. It was the weirdest place I've ever been.</p> <p>Player 3: Sounds good.</p> <p>Player 1: There were like... Mannequins you get out of shops, but with teddy bear's heads on them. Like, they have human legs and stuff, they were arranged in tableaux. And there was one... I can't remember.</p> <p>SR: So a very different experience.</p> <p>Player 1: You don't feel at all connected when you're in there, with that sort of thing.</p> <p>SR: So about the quest. What did you think of it in general?</p> <p>Player 4: I really enjoyed it. I've got to be honest, I was surprised by how much I enjoyed it. I mean... I wasn't thinking it was a bad idea, but I thought, well, it's going to be walking around. But doing it... "everybody laughs" No, but it was really good. That's what I mean. I was like, I was pleasantly surprised by how much I enjoyed that. So yeah, it was cool.</p> <p>Player 6: I enjoyed it as well.</p> <p>Player 4: Yeah, but it converted me.</p> <p>SR: Good.</p> <p>Player 6: Yeah, I think that the directions are good, but it's also nice that it has a bit of history of each place as well. Yeah.</p>
<p>Player 5: Yeah, that's the part I most liked. Because you go through the activity, which is fun, and you enjoy, because it's outside, but you at the same time learn something exciting and new about the city. And then, through the photography you connect with that. [gestures toward the IGPOtY exhibition] So I thought it was a very good flow of everything. Very complementary to each other.</p> <p>Player 1: I wanted it to be longer. With there was more of it. And you could have like a... Because it takes you to the places where there's more natural surroundings, but you could also have surroundings where you find natural things in the high street, or whatever. Like, you can catch the sky in a particular place or...</p> <p>Player 4: Yeah.</p> <p>SR: Well, that's something to incorporate, yes. There is the bonus challenge, because we did want to give the chance to people... If they were too tired, or if they had low mobility... Because that one is harder. But yes, I mean, there's a lot of other places that we can incorporate as well. And it's also interesting to find the natural in the city, not just in enclosed spaces.</p> <p>Player 6: So the idea is great, and it obviously works, so obviously I know that PhDs have a limit of time, but for the future, an idea would be to do different ones with different themes. So this one is nice, it had the gardens, but one along the river, for example, or whatever. I think to expand, maybe?</p> <p>SR: Absolutely.</p> <p>Player 6: Not do a huge one, or maybe do a huge one but then do little ones to do with themes.</p> <p>Player 4: Yes.</p> <p>Player 5: I was mentioning those to you now, when we were walking. It would be great maybe to link it with the tourist information centre. Because if you go to a city and they propose you, hey, you know, there's this activity in the museum, and... So you have access to the exhibition in the museum of the town, plus an activity outdoors. I think it's fantastic. Because you can learn a lot from the city and from the exhibition. So if they would offer it, I'm sure many people would access it. If they offered it to me, in a new city, I would definitely take it.</p>	<p>Player 6: And maybe in the university they could also like...</p> <p>Player 5: Yeah.</p> <p>Player 6: New people coming for open days, as well, incorporate that.</p> <p>Player 2: Yes, that sort of thing.</p> <p>Player 6: Because... Yeah. Because I've lived here for three years and I've learned more in two hours than ever.</p> <p>Player 5: Yeah, more in one activity than... True, true.</p> <p>SR: Good.</p> <p>Player 6: About those places that I've passed by every day.</p> <p>SR: Good to hear.</p> <p>Player 4: It was a really nice way to, sort of, see the city, sort of different areas that I wouldn't have bothered going there. And it's, oh yeah, actually, go in there, cool.</p> <p>Player 2: It does extend the museum experience as well. Because sometimes, I come here quite regularly, but I think I'll go here, or I'll go somewhere outside, depending on the kind of thing whether we want to do, so it's nice to have those two connected so that your museum experience isn't isolated from the city.</p> <p>Player 5: Yeah, absolutely, yeah.</p> <p>SR: And so, what did you think of the actual challenges? Do you think they were easy, varied, and... How did you find them?</p> <p>Player 6: I think... Everyone's taking pictures these days. Every time you go outside for a day out, everyone takes pictures. So it's a very nice way to incorporate that in a challenge, I think.</p> <p>Player 5: Yeah, and it was fun to try to find the squirrels, you have to go around... It was very enjoyable with the flowers in the hottest garden.</p> <p>Player 6: And it makes you look at the flowers, actually.</p> <p>Player 4: Yeah.</p> <p>"everybody laughs"</p>	<p>Player 2: Yeah, it was a good mix of different challenges.</p> <p>SR: Good. So is this something that you usually do? Take photos with your phone, or is this... Or did this give you the opportunity to do something that you probably wouldn't normally stop to do? Or is this something normal?</p> <p>Player 5: I think we do, in general. Lots of pictures.</p> <p>Player 6: But not of specific things.</p> <p>Player 5: Hmm, I don't know.</p> <p>Player 6: Depends on the mood.</p> <p>Player 2: I tend to not take pictures because I know I'm not very good at it. So if it's good to know that they look terrible, so... Yeah, I usually give it to other people to take better ones.</p> <p>Player 4: I think it was quite good to have a bit of direction as well. Like, having the challenge to do. Because otherwise, I don't take many photos. But it was good to have that. Because then there was no thinking you know, what am I supposed to do? What am I going to take photos of? It says, try and find a squirrel or whatever, then it sorts of inspires you to get involved and... Yeah.</p> <p>SR: Okay. And had you ever been on this kind of museum trail before?</p> <p>"everybody shakes their heads" No.</p> <p>SR: It's the first time for everybody?</p> <p>"everybody nods" Yes.</p> <p>SR: Okay. Would you go on something like this again?</p> <p>"everybody nods" Yes.</p> <p>SR: Oh, good. So, some of you had a bit of trouble with technical issues. I will ask about those individually, at the end. But would you change anything in this experience? Some of you said it should be longer and... Is there anything in specific that you would...</p> <p>Player 4: I... It might just be me being petty, but the fact that I had to click to agree to the terms and conditions each time, that bugged me a bit, purely because I always</p>

Excerpts from focus group discussion after launching and playing The Great Exeter Garden Quest, showing their perspective on the experience and how it changed their experience of the exhibition in RAMM.

Player 3: I think it probably gives you a bit of context on how hard it might be to get such great photos.

Player 4: Yeah.

Player 3: When you're... You've just shortly before tried yourself to take a photo. So I think it's interesting to go from trying yourself to seeing some really great examples of people doing that.

Player 2: Yeah, I think I also feel like I wouldn't necessarily be very connected to... I'd look and think that they were all experts, but actually having tried it first did for me, make me feel like I was more linked into it. So, yeah... Closed the distance.

Player 1: Yes, because it sets up your minds to... To see that way as well. Yeah.

Player 4: Yeah, because you've had a taste of how it works. You get an idea of the skill that's involved. You know? I took the pictures of naff, and you see these and you go, wow, that's... That's actually... It's not just point and click, it's this skill. I think that's very good compared to previous exhibitions I've been to, where I've looked around and go, that's very nice, that's a nice painting. But you're sort of distanced from it. So yeah.

Player 5: Yeah, that's the part I most liked. Because you go through the activity, which is fun, and you enjoy, because it's outside, but you at the same time learn something exciting and new about the city. And then, through the photography you connect with that. [gestures toward the IGPOtY exhibition] So I thought it was a very good flow of everything. Very complementary to each other.

Appendix B.4.5. Promotional material produced by the author for *The Great Exeter Garden Quest*



Promotional material produced by the author for The Great Exeter Garden Quest.

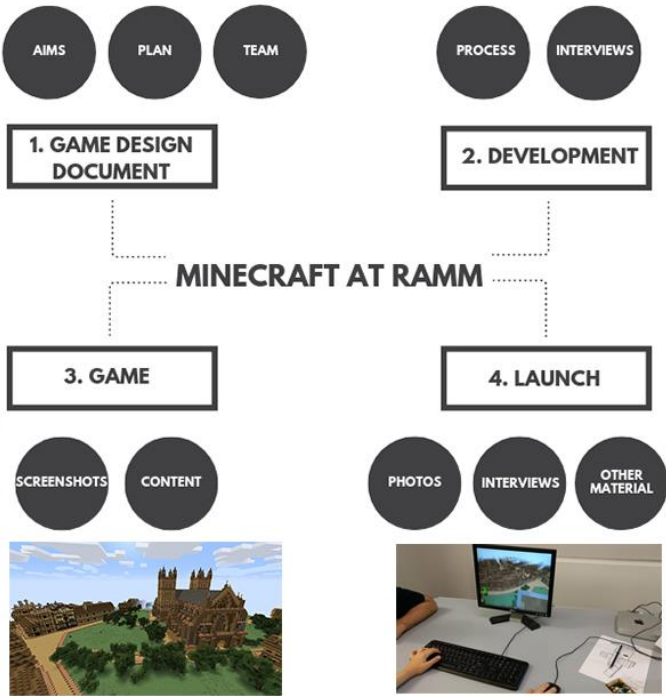
Video shot during the launch:

<https://www.youtube.com/watch?v=tXQLRy8s5AE>

Appendix C. *Minecraft* at RAMM - Game Design Process



This image has been removed by the author of this thesis for copyright reasons.



Appendix C.1. Game Design Document - Excerpts from the game design document for *Minecraft* at RAMM

1. GAME DESIGN DOCUMENT

Excerpts from the game design document for *Minecraft* at RAMM, which was shared between the author, Rick Lawrence and the rest of the Collections team at RAMM, Blockworks, and Adam Clarke, showing information such as the aims of the project, game elements that should be included, and a timeline for the process.

<p>Minecraft at RAMM Design Document 15 March 2017</p> <p>Summary</p> <p>This project investigates how to use a videogame to augment objects in a museum's collection. To that end, we will recreate an object from RAMM's collection: Cath Beddow's model of Exeter in 1750, in Minecraft, and make it available for the community to download and modify. In a later stage in the project, recreate different versions of the city of Exeter through the ages, which will include games that involve selected objects from the museum's collection.</p> <p>Background</p> <p>The Royal Albert Memorial Museum & Art Gallery and the University of Exeter are collaborating on a three-year research project on using playful design and videogames as engagement tools in museums. As part of this project, the museum will invite artists who work within Minecraft to digitally recreate an important object in its collection, in order to give the members of the museum's community (and beyond) access to that object as not simply visitors, but also players. They will also increase the city of Exeter through the ages, incorporating selected objects from the museum's collections into the game space. Hence, this project explores two different ways of gamifying collection objects: first, by replicating them inside the game space, turning them into playable landscapes; second, by incorporating objects into a thematically related playable space, using them to populate the environment within game world and making them part of activities within that world. The interpretation used will come from the A Place in Time project, which is re-examining the rich archaeology and history of Exeter. The use of this content in Minecraft is part of that project's public engagement program.</p>	<p>Description</p> <p>The Royal Albert Memorial Museum & Art Gallery (RAMM) will work an experienced Minecraft team of builders to create Minecraft maps with versions of the city of Exeter through the ages, to be made available to the museum's community to download and modify. The aim is to give the community access to key objects in RAMM's collection, including Cath Beddow's model of Exeter in 1750, and selected objects related to the city through the ages, in a playful and creative way, as well as to make the scholarship around the history of Exeter more visible by using it to make playable recreations of Exeter during important moments in the city's past. These include Roman (early and late), Exeter, and 18th century Exeter, based on the team plan created by Georg Braun (1541-1622) and Frans Hogenberg (c. 1556-88), as they represent the times in the history of the city in which its configuration is better documented.</p> <p>The team of builders will travel to the museum to see the objects up close and document them for visual reference. They will be granted access to Urban Archaeological Database material available for Exeter (digital data detailing the positions and sizes of features in the city at specific times) to increase the accuracy of the landscape recreation. The team will use their expertise to decide the best way to recreate the model within the game, in terms of architectural plans, scale, and types of blocks used. They will work with the museum staff to add historical details and curiosities, mini-games, and Exeter eggs to the map, so that the result will not simply be a recreation, but an enhanced version of the models, using the capabilities afforded by the game. The finished maps will be available for download on RAMM's Exeter Time Trail website, and the museum's community will be encouraged to download, share, modify, build open, and otherwise creatively engage with the work, and in turn share their creations with the museum and the rest of the community.</p> <p>After the model has been made available for download, the museum will organize two in-house Minecraft Days, in which it will showcase and allow visitors to play with the virtual versions of the city, while also being able to see the original objects in the gallery. Possibly, a Minecraft workshop will take place, in which an educator will work with children aged 8 to 12 years-old, in order to encourage them to explore the model</p>	<p>and creatively modify it. The event will also include meetups and signings with YouTubers who create gameplay videos with Minecraft.</p> <p>Functional Requirements</p> <p>Creation of fully functional Minecraft maps, built according to historical specifications, which will be downloadable from the museum's Exeter Time Trail website (http://www.rammuseum.org.uk/minecraft/), and open for the community to modify and interact with. The aim is to make the maps playable, shareable, modifiable, and open, not just static environments to be visited.</p> <p>The scale of the project, including the amount of detail, types of in-game resources to be used, mini-games, historical details, size of the downloadable file and other technical considerations project to be decided by the Minecraft team, in consideration of budget and time constraints (refer to Common People's tender document for a detailed description). Certain Time Trail objects within the museum's collection will be incorporated into the maps; the quantity and choice of which objects would be more adequate is to be decided in discussion between the Minecraft and museum teams.¹</p> <p>The Minecraft team will also provide technical advice to the museum team on how to navigate certain features of the game, if needed.</p> <p>Project Timeline and Budget</p> <p>First phase: approximately 4-5 months to completion.</p> <p>Budget: £5,000</p> <p>March to June 2017</p> <p>March – May 2017</p> <p><small>¹ The Time Trail project is a collaboration between RAMM, the University of Exeter, U3D Models, and the Exeter City Historical Museum. Exeter City Historical Museum is the U3D Model's main custodian. The project of the Time Trail website will be managed by RAMM, using their website and Exeter Time Trail website allowing users to follow, comment and share with the museum, Exeter and Exeter.</small></p>
<p>Minecraft builder or team to travel to Exeter to see and document the model for reference.</p> <p>Build the game version of the model.</p> <p>June 2017</p> <p>Make the model available for download in RAMM's website.</p> <p>Share and publicize the work.</p> <p>Invite the community to modify the map and share the results.</p> <p>Second phase: approximately 10-11 months to completion.</p> <p>Budget: £18,000</p> <p>July 2017 to April 2018</p> <p>July 2017</p> <p>Minecraft Day at the museum: workshops with children aged 8 to 12; showcase of digital Exeter model and community creations; meeting the Minecraft and YouTubers who work with the game.</p> <p>September - December 2017</p> <p>Minecraft builder team to travel to Exeter to see the documentation available on the different versions of the city.</p> <p>Build the early Roman version of Exeter.</p> <p>Build the late Roman version of Exeter.</p> <p>December 2017 – February 2018</p>	<p>Build a version of Exeter in the 17th century.</p> <p>February - April 2018</p> <p>Minecraft Day at the museum: workshops with children aged 8 to 12; showcase of latest maps and community creations.</p> <p>Documentation and Evaluation</p> <p>The project will be documented through the use of different techniques, tailored to the differing stages, the people involved within each stage, and the process being documented.</p> <p>Photographs and video of the Minecraft and museum teams during their visits to Exeter.</p> <p>Audio-only and video interviews with the Minecraft and museum teams.</p> <p>Screenshots and gameplay video capturing during the in-game building process with the Minecraft team.</p> <p>Presenting the map next to the object in the gallery, to discover how it changes / enhances the experience of visitors.</p> <p>Observation of children and families during the workshop days: note down how they engage with the maps and the objects in the collections, what they spend most time on, how they interact with each other, both in and outside the game, what kinds of content they create or contribute to.</p> <p>Semi-structured interviews with the participants in workshop days (directed at the adults, but including questions about their children's experiences): data gathered includes age bracket, group dynamics, the reasons why they were attracted to the workshops, their opinions about the activities, the maps, and the collection objects.</p> <p>Completion of all the digital content created and shared online by the community within the scope of the project, including, among other possible types of content, adaptations of maps, screenshots, videos, and comments on social media.</p>	<p>The evaluation process will include both quantitative and qualitative questions, with a greater importance placed on qualitative engagement with the project and the objects in the museum collection, since that is the focus of this case study.</p> <p>The documentation and evaluation outcomes will potentially be used in:</p> <p>The PhD thesis;</p> <p>Conference papers and presentations;</p> <p>Journal articles;</p> <p>Press material, including, but not limited to: news articles and online videos.</p> <p>Team</p> <p>Rick Lawrence Digital Media Officer at RAMM</p> <p>Sofia Romualdo PhD Researcher at the University of Exeter</p> <p>Adam Clarke Artist and Digital Producer</p> <p>James Delaney Managing Director at Blockworks</p> <p>Links</p> <p>Exeter Model of Exeter Before 1750 http://www.rammuseum.org.uk/object/model-5/</p> <p>Exeter Map of Exeter in the 17th Century: http://www.artfact-map.org.uk/exeter-17th</p>

"The Royal Albert Memorial Museum & Art Gallery and the University of Exeter are collaborating on a three-year research project on using gameful design and videogames as engagement tools in museums. As part of this project, the museum will invite artists who work within Minecraft to digitally recreate an important object in its collection, in order to give the members of the museum's community (and beyond) access to that object as not simply visitors, but also players.

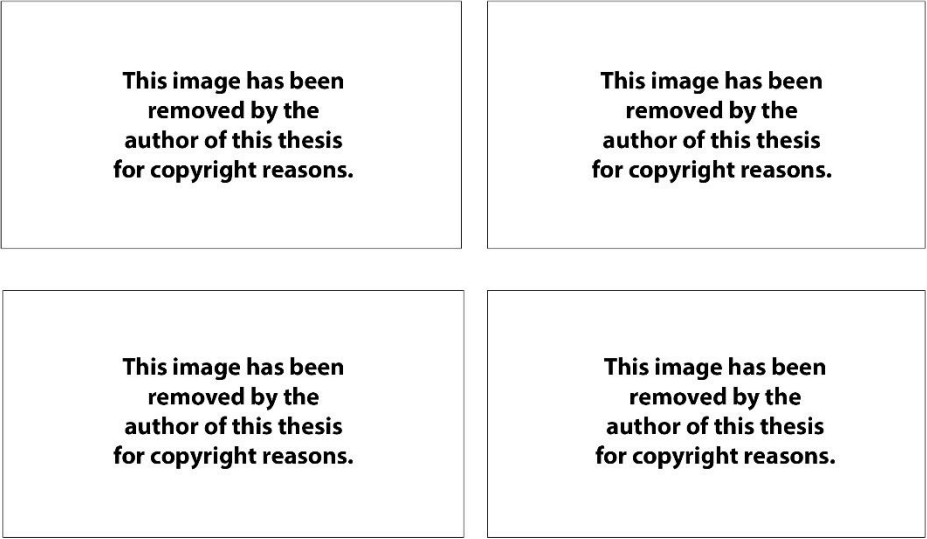
They will also recreate the city of Exeter through the ages, incorporating selected objects from the museum's collections into the game space. Hence, this project explores two different ways of gamifying collection objects: first, by replicating them inside the game space, turning them into playable landscapes; second, by incorporating objects into a thematically related playable space, using them to populate the environment within game world and making them part of activities within that world."

Team:
Rick Lawrence
Digital Media Officer at RAMM
Sofia Romualdo
PhD Researcher at the University of Exeter
Adam Clarke
Artist and Digital Producer
James Delaney
Managing Director at Blockworks

Appendix C.2. Development - Screenshots of work in progress for the Hedgeland Model Minecraft Map. Provided by Blockworks in May 2017

2. DEVELOPMENT

Documentation from the development process of Minecraft at RAMM. The screenshots show how the team initially created the buildings with materials that reflected the real world buildings; this was later changed to reflect the fact that the map is a remediation of a wooden model of the city.



Screenshots of work in progress for the Hedgeland Model Minecraft Map. Provided by Blockworks in May 2017.

Appendix C.3. Game - Screenshots and video of the final map of the Hedgeland Model for *Minecraft* at RAMM, as well as images comparing landmarks to their counterparts inside the game

3. GAME

Screenshots and video of the final map of the Hedgeland Model for Minecraft at RAMM, as well as images comparing landmarks to their counterparts inside the game. Author's own taken during gameplay sessions. The map can be downloaded from <http://bit.ly/RAMMHedgelandMap>. Video link is <https://www.youtube.com/watch?v=Uke8wiUUM1U>

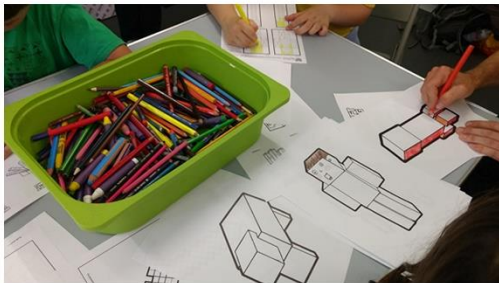


Appendix C.4. Launch

Appendix C.4.1. Photos from the launch of the *Minecraft at RAMM* maps during the museum's *Minecraft Days*

4. LAUNCH

Photos, interviews and notes from the launch of the Minecraft at RAMM maps during the museum's Minecraft Days.



Photos from the launch of the Minecraft at RAMM maps during the museum's Minecraft Days showing the different activities available to participants. These show the diversity of ways that participants engaged with the game within the museum, from playing with the map in computers provided by the museum, to drawing, painting and creating designs out of plastic beads, and participating in build battles projected onto the museum walls.

Appendix C.4.2. Notes on participants and activities during the first *Minecraft* Day at RAMM

<p>Author's notes on participants and activities during the first Minecraft Day at RAMM</p> <p>16 July 2017</p> <p>First interested participants arrived over an hour before doors opened. This confirms how popular the game and event is. Ticketing system broke down immediately creating stress for the staff. Ticketed activities sold out really fast, particularly the building competition. Workshops also very popular. Never seen museum so full. Galleries full of people. Queues outside the entrance corridor to the workshops. Staff looked anxious but in control. Spoke to a few volunteers who seemed delighted to see the museum with so many people, were interested in the activities even though most did not play Minecraft.</p> <p>Building competition had themes suggested by the audience. Audience mostly kids and families who were either waiting to participate or didn't get a chance to but still wanted to watch. Kids and families sitting down or standing around staring at the screen. Looked engaged and interested. Sometimes shouting at the screen or builders in order to participate. Suggestions for themes included sea life, dinosaurs, Romans. Builders looked very engaged and absorbed in building. Guardians looked also interested even though not participating.</p> <p>Plastic beads were used to create blocky looking icons in the format of icons from the game, namely avatars, swords, diamonds, axe. Colours were not always true to the game and many children took liberties with their creations. Same with colouring and drawing. Lego creations were completely random.</p> <p>Hedgeland Model gallery particularly popular as it had free activities involving Lego and colouring / drawing right next to the model. Sadly we were unable to set up screens with the map there, however cards were on hand with link to download the map. Many people took these and mentioned to children they would download when they got home.</p> <p>Children were mainly directing their families towards activities. Adults seemed to sit down more than children, even though there wasn't a lot of places to sit (except in the building competition, but those got full fast). Adults smiled at children and asked where</p>	<p>they would like to go next and what they would like to do, sometimes asking if they were bored if they had been sitting down for a while.</p> <p>Children spent large stretches of time in the building competition, often staying for two rounds (15 – 20 minutes). Workshops got their attention as well, as they stayed in one activity, from exploring the maps in the museum computers, to drawing, colouring, creating patchworks out of plastic beads, creating their own avatar. Plastic beads had to be melted by a museum volunteer, and had to cool down after. Many children were impatient and hovered around the place for cooling down trying to get their creations sooner. Museum computers were slow and sometimes crashed, which seemed to frustrate the children, though not to the extent where they were upset – they just tended to get up and go do something else.</p> <p>Adults spoke to Adam Clarke with interest. Adam was also walking around talking to children and adults alike about the game, the Hedgeland map and the activities of the day.</p> <p>Most activities did not take many people at a time, but many participants seemed content to spectate and look at what others were doing. This did not surprise me as spectator culture is a huge part of the Minecraft community. Players like watching others play to learn and empathise.</p>
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Notes on participants and activities during the first Minecraft Day at RAMM.

"First interested participants arrived over an hour before doors opened. This confirms how popular the game and event is. (...) Ticketed activities sold out really fast, particularly the building competition. Workshops also very popular. Never seen museum so full."

"Audience mostly kids and families who were either waiting to participate or didn't get a chance to but still wanted to watch. Kids and families sitting down or standing around staring at the screen. Looked engaged and interested. Sometimes shouting at the screen or builders in order to participate."

"Hedgeland Model gallery particularly popular as it had free activities involving Lego and colouring / drawing right next to the model. Sadly we were unable to set up screens with the map there, however cards were on hand with link to download the map. Many people took these and mentioned to children they would download when they got home."

"Children spent large stretches of time in the building competition, often staying for two rounds (15 – 20 minutes). Workshops got their attention as well, as they stayed in one activity, from exploring the maps in the museum computers, to drawing, colouring, creating patchworks out of plastic beads, creating their own avatar."

"Most activities did not take many people at a time, but many participants seemed content to spectate and look at what others were doing."

Appendix C.4.3. Interview with participant of first *Minecraft Day* at RAMM

16 July 2017

SR: Can you tell me your name, please?

Guardian 4: [redacted]

SR: Have you visited RAMM before?

Guardian 4: No.

SR: This is your first time?

Guardian 4: Yes.

SR: Who are you visiting with today?

Guardian 4: My son.

SR: Was it Minecraft that made you come to the museum?

Guardian 4: It was, yeah.

SR: Is your son a Minecraft player?

Guardian 4: Yes, he is.

SR: How long has he been playing?

Guardian 4: Probably, I would say eighteen months.

SR: What does he usually do inside the game?

Guardian 4: Inside the game? Build. We kind of restrict him to the creative side of it, rather than the survival. So it's about creating and building.

SR: What does he usually build?

Guardian 4: Habitats, homes, farms, museums... Predominantly buildings.

SR: How old is he?

Guardian 4: Eight.

SR: In what activities did you participate, beyond the building battle?

Guardian 4: We went to the workshop with Wizard Keen, and also, after that, we went downstairs, we explored the museum, and he built some things with Legos. So the interactive things.

SR: Did you take a look at the Hedgeland model?

Guardian 4: Yes, we did.

SR: Were you aware of its existence before coming here?

Guardian 4: No, not before this. First time.

SR: It's a model of eighteenth-century Exeter, and the museum recreated it inside the game. Were you aware of the existence of this Minecraft map?

Guardian 4: No.

SR: Do you think that it would be something that your son would be interested in playing with?

Guardian 4: Yes, definitely. Especially because if it's something that he can relate to, Minecraft is a really abstract thing, but it kind of makes it come alive if you can meet people like Adam, who's the YouTuber. If you can... And then also recreate and create and interact with landmarks that are around you, I think that that's a really positive thing.

SR: Basically, inside the map we have historical characters that tell the story of eighteenth-century Exeter. We wanted to make the history of Exeter and the lost heritage of Exeter visible inside the game. Do you think that having Minecraft at the museum can improve the way that children engage with the collection objects?

Guardian 4: Definitely, absolutely. And I think that the only way that you're going to be able to engage this generation, my son's generation, is through things they can relate to. They have such an overwhelming input when it comes to the Internet. It's not, you know, it swamps them. But if you can find something that engages them, like the computer games, it means you've got a much better chance of them actually absorbing that kind of data and retaining it, because they're engaged.

SR: Would you participate in similar activities focused in other objects in the museum's collection?

Guardian 4: Yeah, definitely. If it was something that he was keen on and interactive, we do a lot of museum visiting, we do a lot of gallery visiting, we're National Trust members, but the thing that excites him the most is the kinaesthetic practical things that you can engage with. And if it involves anything to do with digital, building, constructing, you know, and obviously, the computer element, then yeah. It makes my life easier because I don't have to drag him around a museum when he's really bored.

SR: We're making more maps in Minecraft. The next one is going to be a Roman map, and it's also going to be related to the Seaton Down hoard, which you can now also find on exhibit here. We hope to see you in the next Minecraft Day.

Guardian 4: Absolutely.

SR: Thank you.

Appendix C.4.4. Interview with participant of second *Minecraft Day* at RAMM

10 February 2018, RAMM

SR: First of all, thank you so much for agreeing to be interviewed. What is your name?

Guardian 21: That's okay. [redacted]

SR: And who are you visiting with today?

Guardian 21: I'm visiting with two daughters, [redacted], who's nine, and [redacted], who's six.

SR: Is this your first visit to RAMM?

Guardian 21: No, it's not, no. We've been coming probably since the girls have been about a year old, I suppose. We just use it as somewhere to bring them. Good for me for a coffee, and they've grown up sort of knowing the museum.

SR: So you're local to Exeter?

Guardian 21: We're local, yeah, we live in Exminster, which is about five miles away.

SR: Okay. Do you usually visit as a family?

Guardian 21: Tend to visit myself and my daughters, because my wife has been freelance and she's retraining, but we do have Sundays when we will come and visit as a family all together, or if there's an event on.

SR: So what made you want to come to the museum today for this event?

Guardian 21: So both girls play and use Minecraft. [Redacted] started when, my oldest who's nine, started when she was about six years-old, because a cousin introduced her to it. I'd already seen Minecraft as a game, not that I'm a heavy gamer, but I work in technology, so I was aware of it. I do work with Microsoft, so I do know the Microsoft education team. So [redacted] has been using Minecraft for about three years now, and her sister then started about sort of two years ago, in a small way, and now she plays as well. They play together. And they play on

all platforms, on iOS, and on the iMac, and this Christmas, they got an Xbox. So yeah, both girls interested in Minecraft, and we've attended other Minecraft related events around the area, and [redacted] got to go to Minecon in London last year.

SR: What do they usually do in Minecraft? Do they build things, and what kinds...

Guardian 21: So yeah, they play, so both play predominantly in creative mode, that's how [redacted] played probably for about two years, in a non-server related environment, so just playing standalone, and [redacted] would just make things, and she'd go into YouTube for inspiration. Obviously she found some of the YouTubers, like DanTDM, so she'd see stuff, and then, or maybe build battles, and then she'd go into the game, and build stuff. And then, together, when they're not doing sports stuff, on a Saturday and Sunday, they will hook up on their tablets together, on Kindles, and they'll play in the same world, and just build things, really. They've switched a little bit into survival, so specially [redacted], and she's helping her sister, really, just to kind of find a way, really, around that kind of world. They play, and have played on some multi-party server stuff, like Hypixel, but they're not so keen, really. [redacted] has done kind of build wars, and kind of server games like that, she did that at Minecon, those were the competitions she entered there. But they're quite happy just to play in the same world together and build.

SR: So how different do you feel that the visit to the museum is when you have activities such as this going on?

Guardian 21: Say the question again, please.

SR: How different is the visit to the museum when you have activities like this?

Guardian 21: Yeah, I mean, they view it in a slightly different way. They're always keen to come to the museum, if we're in town, just to come and have a look, even though they've been so many times, there's always something new that they end up focusing on. Yeah, just learning about something, something they've learned at school, that then they'd see something related to. But when there's a focused event like this, then they're kind of, the draw in is Minecraft, you know? If it was in a school hall, and it was Minecraft, they'd still want to go, really. The better thing here, really, is that we're in a learning and educational environment, rather

than it just being run from a village hall. So you've got the bonus of, one, having all the facilities for parents, and secondly, like we did first thing, we spent half an hour just having a look around, and they wanted to go to the shop, and yeah. So yeah.

SR: Have you played any of the, or have they played any of the Minecraft maps that RAMM has created?

Guardian 21: No, they haven't. So I saw Rick [Lawrence] at Digital Exeter, and he did a talk about the maps, and I was aware that they'd been created from following RAMM on social media. We've just not got around to downloading them, really. That's the only reason why. It's just purely kind of my time, or just pointing Jasmine at it to install the maps. So yeah, I've got the details, I've grabbed the card this morning from the shop, so I'll try to get around to it soon.

SR: Are you familiar with the Hedgeland model of Exeter in 1769, that's in the galleries?

Guardian 21: Yeah, we are, yeah.

SR: Because that's the first map that we...

Guardian 21: That's the basis, yeah, sure.

SR: So the idea is to give people the opportunity to look at the object, and then visit it in Minecraft. What's your opinion...

Guardian 21: That's great, really, because it's linking something... The girls are always, they always look at the map, always stop there, we always try to work out where somewhere is in Exeter, and relate it to the map. So if we see it today, if we can find time at lunch time to go and visit, then, if I can get it loaded in tomorrow, then it will link the two things together, really, which is great.

SR: And it's the same... Well, slightly different with the Roman map, because it has the artefacts that you can find in the galleries inside the map. It's slightly different.

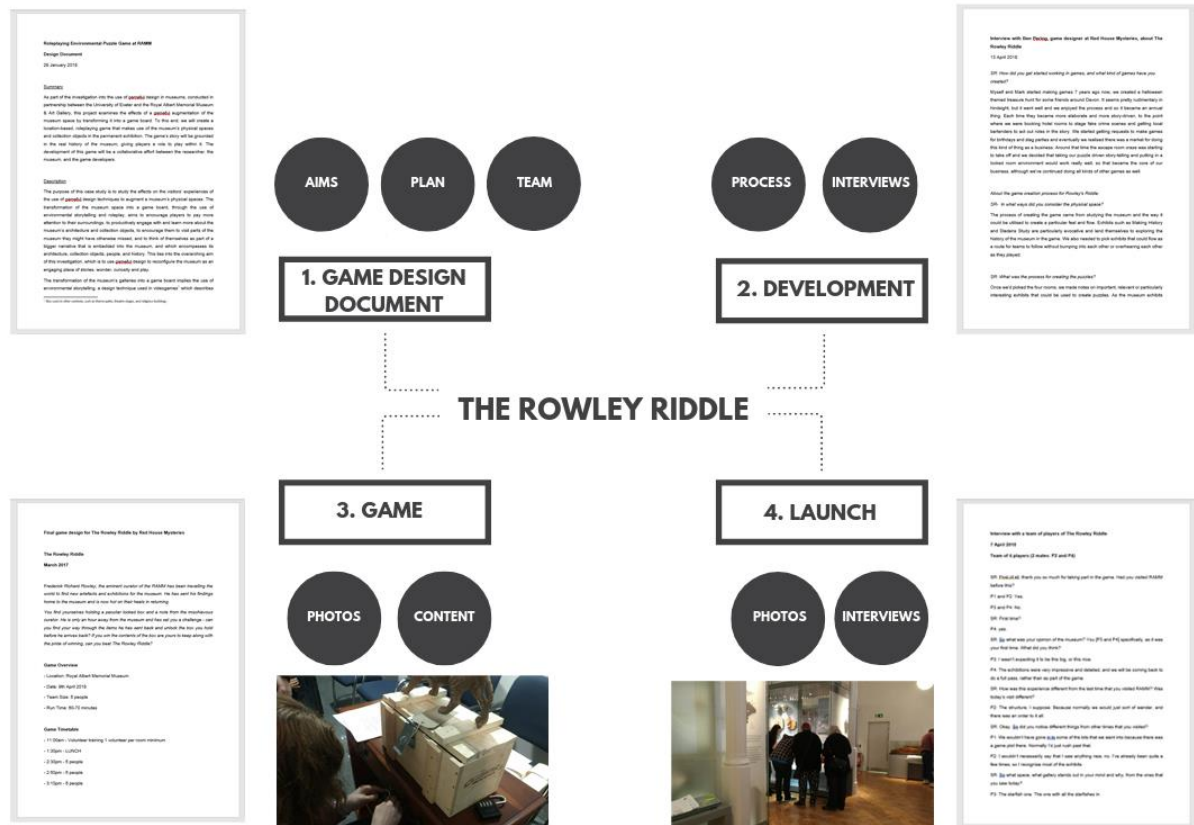
Guardian 21: Yes.

SR: So do you feel that having games in the museum can improve the way that children learn or engage with the collection?

Guardian 21: Yeah, I mean, I think, you know, gamification of stuff now... Because children are so born into, you know, normally, if they're supposed to anyway join into games in mobile devices, or whatever platform at home, then trying to link that in some way with something educational, I think is of real benefit, rather than just playing games just for games' sake. Which is good for them to stop doing learning, or sport, or whatever, they can switch off, but you know, they're fairly addictive, games, I suppose. And I like Minecraft because it's virtual Lego, really, which I grew up with Lego, and loved it, spent hours and hours playing it, as well as playing lots of computer games. I had a, I was fortunate, but dad bought a handy TR-80 [?] computer back from America when I was about six years-old, and I learned to code when I was about eight, and then that propelled me through a life of using technology in my career. So, for the girls, really, whether they end up working in technology or not, it's going to be coding and those kinds of skills, are going to be pretty essential, really. So, you know, Minecraft I see as a great platform, probably the best platform there is, really, at the moment, for learning. [redacted] can hack Minecraft. We've done redstone projects where can link Minecraft then with physical computing, and things like that. So it brings up a huge range of opportunities, and at the end of the day, they can then just play it as well. So, you know, you can kind of subtly draw them into learning without them realising that you're teaching them.

SR: Great, thank you so much, and I hope you enjoy the rest of your day.

Appendix D. *The Rowley Riddle* - Game Design Process



Appendix D.1. Game Design Document - Excerpts from the game design document for *The Rowley Riddle*

1. GAME DESIGN DOCUMENT

Excerpts from the game design document for The Rowley Riddle, which was shared between the author, Rick Lawrence and the rest of the Collections team at RAMM, and the Red House Mysteries team, led by Mark Nicholls and Ben Pering.

<p>Roleplaying Environmental Puzzle Game at RAMM</p> <p>Design Document</p> <p>29 January 2018</p> <p>Summary</p> <p>As part of the investigation into the use of <i>gameplay</i> design in museums, conducted in partnership between the University of Exeter and the Royal Albert Memorial Museum & Art Gallery, this project examines the effects of a <i>gameplay</i> augmentation of the museum space by transforming it into a game board. To this end, we will create a location-based, roleplaying game that makes use of the museum's physical spaces and collection objects in the permanent exhibition. The game's story will be grounded in the real history of the museum, giving players a role to play within it. The development of this game will be a collaborative effort between the researcher, the museum, and the game developers.</p> <p>Description</p> <p>The purpose of this case study is to study the effects on the visitors' experiences of the use of game design techniques to augment a museum's physical spaces. The transformation of the museum space into a game board, through the use of environmental storytelling and roleplay, aims to encourage players to pay more attention to their surroundings, to productively engage with and learn more about the museum's architecture and collection objects, to encourage them to visit parts of the museum they might have otherwise missed, and to think of themselves as part of a bigger narrative that is embedded into the museum, and which encompasses its architecture, collection objects, people, and history. This ties into the overarching aim of this investigation, which is to use game design to reconfigure the museum space as an engaging place of stories, wonder, curiosity and play.</p> <p>The transformation of the museum's galleries into a game board implies the use of environmental storytelling, a design technique used in videogames¹ which describes</p> <p>¹ Also used in other contexts, such as theme parks, theatre stages, and religious buildings.</p>	<p>the act of advancing a narrative through the use of details in a built environment, rather than solely through words or other, more traditional storytelling strategies. In the case of museums, this design technique should make use of the immersive physical characteristics of the building and galleries, particularly if these are specific to the museum in question and reflect something of its history, in addition to the evocative power of collection objects. Challenges and activities within the game should make as much use as possible of architectural details and collection objects on view in the permanent exhibition (see the section on design specifications). This aims at creating what is often called, within games, stealth learning, which describes the fact that players learn new information naturally through the course of gameplay, often without realising it. Additional props and objects can be used to aid in the creation of ambience and to facilitate gameplay: for example, players can be given a kit with a map, communication devices, some sort of identification, and other objects to aid them in their quests, and different props can be added to the museum's space.</p> <p>The game's story should be related to the history of the museum, with the participation of characters inspired in their real counterparts. However, while historical accuracy is important, there is some flexibility for imagination and make-believe if that suits the story and gameplay. This includes, but is not limited to, artistic liberty when developing characters (within certain limitations, in the case of real life personas), the creation of fictional, but historically accurate characters, the use of anachronisms, and the use of fictional narrative devices such as time traveling, among others. The story should give players the opportunity to step into a role, such as that of an explorer, time traveller, curator's assistant, or other. The aim of using roleplaying as a <i>gameplay</i> design technique is to encourage their emotional, as well as intellectual, engagement with the museum and investment in the story. The exact setting, plot, mystery, challenges and roles for players to play will be developed by the game developers, with the assistance of the researcher and the museum team.</p> <p>The game's development is directly connected to the investigation being developed in partnership between RAMM and the University of Exeter; however, its scope and legacy go beyond that of the investigation, meaning that the game should be reusable by the museum in the future.</p>
<p>Design Specifications</p> <p>While the creation of the game will be a collaborative and iterative process, and therefore open to the input of everyone involved, certain design specifications have to be met in order for the game to be used as a case study in the investigation:</p> <ul style="list-style-type: none">The game must implicate the museum's physical space within its gameplay. Players should be required to move around the museum, exploring, paying attention to their surroundings and looking for clues, some of which should be directly related to the museum's architecture and objects in the permanent collection displays.The game's challenges and story should make as much use of the collection objects on exhibition as possible, preferably by drawing attention to certain details in the objects themselves or to information about them.The game's story must be related to RAMM's real-life history and characters, such as famous curators or collectors (although it does not have to be limited to them – new, fictional characters can be created for storytelling purposes).The game must require its players to play a role within the story, allowing them to feel not just intellectually, but also emotionally invested.The game should be cooperative, instead of competitive.The game is to be played after hours, after the galleries have been closed to the general public, to minimise disruptions and allow interventions upon the space. <p>Budget</p> <p>Total budget: £2500.</p> <p>Must be invoiced by mid-March.</p> <p>The game is set to debut on 7 April, Saturday, RAMM's <i>Gameplay</i> Day. This will also allow it to be part of the museum's 150th anniversary celebrations.</p> <p>Documentation and Evaluation</p>	<p>This research will focus on the documentation of the design process and on a qualitative evaluation of the gameplay experience. As such, it will include:</p> <ul style="list-style-type: none">Observation and written description of the design process.Photographs, observation and written description of choices and activities by members of the user group research team of players, during gameplay within the museum.Semi-structured, audio-only interviews with players of the user group research team, after the gameplay experience. These interviews will focus on their choices, actions and experiences during gameplay, their reasons for playing, the dynamics and interactions with the group, their existing museum-going habits and relationship to RAMM, their perspectives on experiencing the museum and its collection objects during gameplay, as opposed to during a normal visit, among other questions. <p>Players will be required to sign an authorization form prior to playing, in order to be part of the research.</p> <p>Team</p> <p>Rick Lawrence</p> <p>Digital Media Officer at RAMM</p> <p>Sofia Romualdo</p> <p>PhD Researcher at the University of Exeter</p> <p>Red House Mysteries: Mark Nicholls and Ben Pering.</p> <p>Developers of location-based games in Exeter</p>

“The purpose of this case study is to study the effects on the visitors’ experiences of the use of game design techniques to augment a museum’s physical spaces. The transformation of the museum space into a game board, through the use of environmental storytelling and roleplay, aims to encourage players to pay more attention to their surroundings, to productively engage with and learn more about the museum’s architecture and collection objects, to encourage them to visit parts of the museum they might have otherwise missed, and to think of themselves as part of a bigger narrative that is embedded into the museum, and which encompasses its architecture, collection objects, people, and history. This ties into the overarching aim of this investigation, which is to use game design to reconfigure the museum space as an engaging place of stories, wonder, curiosity and play.”

“In the case of museums, this design technique should make use of the immersive physical characteristics of the building and galleries, particularly if these are specific to the museum in question and reflect something of its history, in addition to the evocative power of collection objects. Challenges and activities within the game should make as much use as possible of architectural details and collection objects on view in the permanent exhibition (see the section on design specifications).”

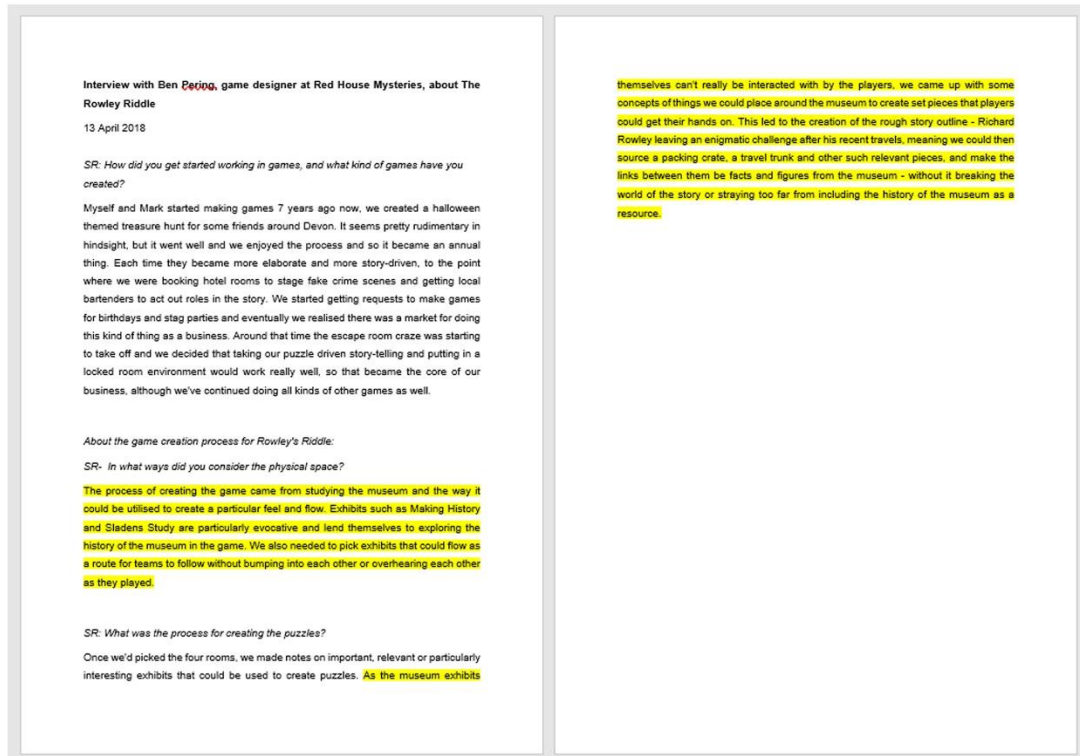
“Additional props and objects can be used to aid in the creation of ambiance and to facilitate gameplay: for example, players can be given a kit with a map, communication devices, some sort of identification, and other objects to aid them in their quests, and different props can be added to the museums space.”

“The game’s story should be related to the history of the museum, with the participation of characters inspired in their real counterparts. However, while historical accuracy is important, there is some flexibility for imagination and make-believe if that suits the story and gameplay.”

Appendix D.2. Development - Interview with Ben Pering, game designer at Red House Mysteries

2. DEVELOPMENT

Documentation from the development process of The Rowley Riddle.



Interview with Ben Pering, game designer at Red House Mysteries, showing how the design process took into account the exhibits, the stories and the characteristics of the museum space.

"The process of creating the game came from studying the museum and the way it could be utilised to create a particular feel and flow. Exhibits such as Making History and Sladens Study are particularly evocative and lend themselves to exploring the history of the museum in the game. We also needed to pick exhibits that could flow as a route for teams to follow without bumping into each other or overhearing each other as they played."

"As the museum exhibits themselves can't really be interacted with by the players, we came up with some concepts of things we could place around the museum to create set pieces that players could get their hands on. This led to the creation of the rough story outline - Richard Rowley leaving an enigmatic challenge after his recent travels, meaning we could then source a packing crate, a travel trunk and other such relevant pieces, and make the links between them be facts and figures from the museum - without it breaking the world of the story or straying too far from including the history of the museum as a resource."

Appendix D.3. Game - Excerpts from final game design for *The Rowley Riddle* by Red House Mysteries. Photo of one of the puzzle boxes being prepared by the team

3. GAME

Excerpts from final game design for *The Rowley Riddle* by Red House Mysteries showing the final choice of story and some of the puzzles to be created. Photos of puzzle boxes being prepared by the team, illustrating the props that were added to the museum space as part of the game.

The Rowley Riddle
March 2017

Frederick Richard Rowley, the eminent curator of the RAMM has been travelling the world to find new artefacts and exhibitions for the museum. He has sent his findings home to the museum and is now hot on their heels in returning.

You find yourselves holding a peculiar locked box and a note from the mischievous curator. He is only an hour away from the museum and has set you a challenge - can you find your way through the items he has sent back and unlock the box you hold before he arrives back? If you win the contents of the box are yours to keep along with the pride of winning, can you beat The Rowley Riddle?

Game Overview

- Location: Royal Albert Memorial Museum
- Date: 9th April 2018
- Team Size: 5 people
- Run Time: 90-120 minutes

Game Timetable

- 11:00am - Volunteer training 1 volunteer per room minimum
- 1:30pm - LUNCH
- 2:30pm - 5 people
- 2:50pm - 5 people
- 3:10pm - 5 people
- 3:30pm - 5 people
- 3:50pm - 5 people

- 5:00pm - CLOSE



Game Description

Backstory: the curator Richard Rowley has been off collecting new artefacts and putting together a new exhibition. He has shipped all the new items back to the museum ready to be displayed. There is only one complication - he has locked it all up with locks and puzzles and challenged the set up staff (the players) to use their wits and knowledge to solve all his challenges before he returns in an hour (he is 'on the train from London' as they play). As they start they receive a locked box with a prize inside, if he beats them back then he will take the prize but if they unlock it before his return then it is theirs to keep forever.

4 rooms will be used with the players spending 15 minutes in each: Down To Earth, Making History, Sladen's Study and Case Histories

In each room the players will work through the set piece game and solve it to find a part of directions to the final key location. If they solve the all 4 rooms they will be able to deduce the location of the key that unlocks their box and allows victory!

- A small speaker set will play generic music in each area and a volunteer will turn over the 15 minute sand timer in each room as they start.
- Room 1: Down To Earth
- A museum Packing crate sits on the floor of the room along with a delivery note showing that it is one of the exhibit crates sent by Rowley.
- TWO PUZZLES TO UNLOCK THE CRATE - getting smaller, like russian dolls to the central prize
- Gives the clue: 'Up the stairs past Albert watching...'
- Room 2: Making History
- A projector is set up on a tripod along with some other small cases/crates. The power cable for the projector leads into a locked box, clearly they need to unlock the box to power on the projector.



"Backstory: the curator Richard Rowley has been off collecting new artefacts and putting together a new exhibition. He has shipped all the new items back to the museum ready to be displayed. There is only one complication - he has locked it all up with locks and puzzles and challenged the set up staff (the players) to use their wits and knowledge to solve all his challenges before he returns in an hour (he is 'on the train from London' as they play). As they start they receive a locked box with a prize inside, if he beats them back then he will take the prize but if they unlock it before his return then it is theirs to keep forever.

- 4 rooms will be used with the players spending 15 minutes in each: Down To Earth, Making History, Sladen's Study and Case Histories

- In each room the players will work through the set piece game and solve it to find a part of directions to the final key location. If they solve the all 4 rooms they will be able to deduce the location of the key that unlocks their box and allows victory!"

Appendix D.4. Launch

Appendix D.4.1. Photos and notes on players from the launch of *The Rowley Riddle*

4. LAUNCH

Photos, interviews and notes from the launch of *The Rowley Riddle*.

Author's notes on players during the launch of *The Rowley Riddle*
7 April 2018

Players' behaviour and social dynamics:

Players started in a room where they were introduced to the game, then taken to the first gallery and told the timer had started. All players rushed to the object that was clearly an addition to the gallery for the game (suitcases, grandfather clock etc.) to see what kind of clue they had and what information they needed. They knelt or bent down to examine them. They read aloud and set off to explore the gallery. Mostly they did this separately or in groups of two. When a player found something they called out to the rest of the group and everyone gathered around a specific object or exhibit. Sometimes a player would take a photo of a label and come back to the suitcase to read it.

Players did not run but they stood out from non-playing members of the public because they were moving at a faster walking pace and with more purpose, glancing at objects and moving on quickly once they realized it wasn't the object or information they wanted. This way of engaging with the content stood in contrast with other visitors and is reminiscent of the one I saw with *Fire Hazard Games*. It does seem to suggest that players are only "skimming" the galleries for the relevant content.

Some players were approached by non-playing members of the museum going public, who were curious as to what was going on. When this happened, players usually smiled and stopped what they were doing to briefly explain they were playing an escape room style of game. They would then continue searching for clues and trying to solve puzzles.

Many players got stuck in certain places: for example, deciphering the message with the semaphores, which had a technical glitch and was going too fast for players to get it. They expressed frustration and asked the volunteer if they could slow it down (we couldn't so ended up helping them with the answer).

Cooperation. Discussing thoughts, objects, calling team mates to point at objects, asking someone else to read something or use an object (for example, the telescope over the café, which they had to look through in order to find a clue, or the microscope).

Competition. Players often asked at the end how good they were in comparison to the other teams that had already played that day.

Didn't mention the story at all while playing.

The last clue was by far the fastest one to be solved, leading some players to think that the game was not over as they did it with a few minutes to spare. This happened with all teams except one, who took the entire time to find the clue hidden behind a picture of a bird.

By the end, players took some time to regroup and discuss the game, seeming in good spirits and talking to one another.

General feedback from players:

- . All players said they enjoyed the experience and would come back to the museum to play other games in the same style
- . Some players found it difficult in places, such as when having to decipher the semaphore message or having to find the hammer in the same room; the presence of a volunteer, not just to re-set the puzzles, but also to give clues when needed, was a plus
- . Most players mentioned that they expected the final puzzle to be more difficult
- . Some players with previous experience with escape room style of games found the game too easy in places
- . In response to the museum's visitor team asking about this: regarding ticket prices, all players said they were surprised at the low price, and they would pay more for the same experience; suggestions went from 5 to 10 GBP per ticket (some players mentioned the need to still keep them more accessible than regular escape room games)
- . Some players mentioned they would like to play the game with their families, or that it would be interesting to set the game up for school groups, but that they thought having only 10 minutes for each puzzle would probably not be enough when playing with children.



Photos and notes on players from the launch of *The Rowley Riddle*, showing evidence of their behaviours and how they interacted with the museum content during gameplay.

"Players did not run but they stood out from non-playing members of the public because they were moving at a faster walking pace and with more purpose, glancing at objects and moving on quickly once they realized it wasn't the object or information they wanted. This way of engaging with the content stood in contrast with other visitors and is reminiscent of the one I saw with *Fire Hazard Games*. It does seem to suggest that players are only "skimming" the galleries for the relevant content."

"Cooperation. Discussing thoughts, objects, calling team mates to point at objects, asking someone else to read something or use an object."

"Competition. Players often asked at the end how good they were in comparison to the other teams that had already played that day."

"Didn't mention the story at all while playing"

Appendix D.4.2. Interview with players after playing *The Rowley Riddle*

7 April 2018

Royal Albert Memorial Museum & Art Gallery

Team 2, made of 4 players (2 males: P2 and P4)

SR: First of all, thank you so much for taking part in the game. Had you visited RAMM before this?

P1 and P2: Yes.

P3 and P4: No.

SR: First time?

P4: yes.

SR: So what was your opinion of the museum? You [P3 and P4] specifically, as it was your first time. What did you think?

P3: I wasn't expecting it to be this big, or this nice.

P4: The exhibitions were very impressive and detailed, and we will be coming back to do a full pass, rather than as part of the game.

SR: How was this experience different from the last time that you visited RAMM? Was today's visit different?

P2: The structure, I suppose. Because normally we would just sort of wander, and there was an order to it all.

SR: Okay. So did you notice different things from other times that you visited?

P1: We wouldn't have gone in to some of the bits that we went into because there was a game plot there. Normally I'd just rush past that.

P2: I wouldn't necessarily say that I saw anything new, no. I've already been quite a few times, so I recognise most of the exhibits.

SR: So what space, what gallery stands out in your mind and why, from the ones that you saw today?

P3: The starfish one. The one with all the starfishes in.

P4: And the one with the giraffe, that was cool.

SR: What about you? [to P1 and P2]

P2: Well, I like them all, really. None stand out... Having been here quite a few times, they were all quite familiar, so...

P1: I've always liked the one where the coins are, but I saw more of the starfish one.

SR: What about an object? Which object that the game directed your attention to do you feel like...

P3: The hammer. The hammer that was hanging from the ceiling. I would never have spotted it otherwise, so...

P4: The coins, as part of the game, yeah.

P2: Probably the starfish, because we spent quite a bit of time in there.

SR: Do you agree? [to P1]

P1: Yeah.

SR: Okay. As you normally visit museums... Because I asked them how different this visit was from their last time, but how different was this from other times that you've visited museums? So, to create this structure, like you said, around a game, as opposed to just visiting without the game? How different did it feel?

P3: Well, it felt more rushed, and I guess I didn't have time to take anything in, really, rather than specifically what we were trying to do for the puzzles. I don't know... Yeah, it would be nice to have puzzles that you could do in your own time, so you have time to, like, take everything in. Obviously, there's funness about having to do something quickly. But yeah, from the museum's point of view, I'd say you'd wanna have a puzzle but you've got loads of time, all the time to do it. But you'd have to find, you'd still have to find an answer. But then you can take your time to look at everything.

P4: Yeah, with the use of riddles and all that stuff.

P3: Yeah, that's what I mean, have it all, but don't have it rushed. Then I think you could take more in.

SR: So no time limit?

P3: Yeah.

P2: I have done a treasure hunt here before, which was a bit like that. So you followed clues around, which was kind of a good idea, because it forced you to stop and look at different things, a bit like this but without the time pressure.

SR: Do you feel like the time pressure kind of limited...

P2: Well, we came for that.

P1: That's true.

P2: So we did it because it's an escape room type thing in the museum, not because it's a museum, so...

P1: Yeah.

SR: Do you usually do escape rooms?

Everyone: Yes.

SR: So what do you like about escape rooms?

P3: It is the pressure, I suppose. It is actually figuring out the answers to all the puzzles in that time frame, I think. Yeah. But I guess because it's a museum environment, I feel the need, I feel like I should be learning. [laughs] And so then I don't want to rush. It's a bit conflicting, but...

P1: I like the fact that, nowadays, there's always things in museums which are playful for children, but it's actually quite important to still be playful for adults, so this is a nice kind of alternative to those cool bee bags that children walk around with. [laughs] Because I still want to do that as an adult, but I can't walk around with one of those bags. [laughs] I probably could, actually.

SR: So would you play similar games if the museum had other themed games, for example? [everyone assents]

P1: This is a really good thing for the museum, because obviously, they have changes in some of the exhibits, but a lot of it is still the same, so it's nice to be able to explore it in different ways. So it's about how you come across those items, rather than what you come across. So it's a way for us, who have visited before, we can still come back and do something new and exciting.

SR: In the permanent collection, that doesn't change.

P1: Yes.

SR: So you mentioned that maybe this was good for learning. Did you learn anything new today, that you didn't know?

P3: Yeah, I learned what Pangaea meant. [everyone laughs] Yeah, it's just taking little bits of information, isn't it? Like knowing that it was inspired by Albert's Great Exhibition. It makes sense, but you just don't know that until you look it up. It's something that I would have just scanned.

SR: So do you feel... How was the experience with your team mates? How was the experience of playing together?

P2: We did well as a team. [everyone assents] I think we all added something, somewhere.

SR: You didn't know each other?

P2: No.

SR: Do you feel like this is a good way to meet like-minded visitors, as well?

P1: I suppose, from my point of view... Because when I go to an escape room, I go with people I know, and I know what I can get away with, whereas here I have to hold back a little bit and not just take over, when it's with people you don't, because that would be rude. [laughs] So it adds a different element to it, rather than doing it as a group on your own, with people you know.

P2: It's good teamwork, team building.

SR: So you brought different abilities and contributions to the team.

P3: I think each of us did something on our own almost and brought it together, so there were aspects that we wouldn't have got otherwise if one of us hadn't,

sort of... Because you did the coin thing. [to P4] And someone else found the seagull. Each of us all had... Remembered different things, and... Yeah.

P4: We did all work on that semaphore. That was hard.

SR: Was that the hardest puzzle, do you think?

P3: It was just reckless.

P4: The interpretation of that gentleman's arms seems a little bit off.

P1: Certain puzzles we've all come across in different, like, in the past, so as soon as I saw the semaphores, I was like, oh no. [laughs] But it's personal, isn't it? So...

SR: Finally, my last question is, what do you feel about price point for the tickets? Do you feel like you could pay more, pay less? How do you feel about that?

P4: How much was it?

Everyone else: Three pounds.

P2: I think that's reasonable. Very reasonable, yeah.

P1: It's cheaper than escape rooms, but it's a more diluted experience here, so I think it balances out. I think it's a little bit on the cheap side, but at the same time, it means that more people can access it, while with escape rooms, it is a bit of a pay-out.

P3: I agree with everything.

SR: Awesome. Thank you again so much.

Appendix E. Excerpt from interview with Julien Parsons (Senior Collections Officer at RAMM) and Rick Lawrence

2 February 2017, RAMM, Exeter

SR: Can you start by talking about the museum's mission, and how the community, or the audience, fits into that mission?

JP: We do have a mission statement. We are a service of the city council, an elected group democratically accountable to the people of Exeter, which has been running the museum since 1870. In a way, the people of Exeter have been the museum's stakeholders since 1870. The mission also states that we are keepers of information, we have to look out for the collections, give access to the collections, and inspire people. That's our mission as an organization. RAMM is strongly aware of the fact that it relies on local support, and on the audience's support. The people of Exeter are genuinely positive about RAMM. When we talk to colleagues from other museums around the country, they sometimes struggle to say that they're truly representative of the full demographic range of the area, while in RAMM it's easy to prove that the people who come to the museum represent a strong cross-section of the people living in Exeter and its surroundings. We have a purpose in terms of the collections being at the heart of it, but we're always reliant on audiences and what they want from us.

RL: That's a fine summary. It's interesting that even with digital channels like Twitter, which is very international, and Facebook in particular, we get a lot of local engagement. We see much of our engagement from local individuals who visit the museum, and on Twitter, again, lots of local organizations engage with us. People visit us, and then share their visits. We also see local people who put reviews about the museum on TripAdvisor, so that local connection comes through strongly there as well.

JP: It's interesting that there is this strong local focus, but the collections are international. Some museums only have local material on display, but you can't say that about RAMM. A good percentage, probably fifty percent, maybe more, of the collection is not from Exeter. They have a connection to Exeter and Devon,

but they're not actually from Exeter. It's not as though people are interested in a very narrow, parochial history, they're interested in the big stories, but told through a local angle.

RL: And there's the diversity of the collections here in Exeter. It's one of the things I love about working here. We aren't just a big art collection, or a big local history collection, we have this diversity of natural history, world cultures, fine and decorative art, antiquities... Lots of contemporary art as well, since we're still accessioning items. It's very much a living collection.

JP: Although that does present challenges. Some galleries or museums, they have one image, or one collection that sums up the whole building and the whole experience, while if you come here, there's lots of different things that you could choose from, that you could focus on particularly in the collection. From a marketing point of view, this is quite challenging. The diversity is great, but it's also quite challenging. (...)

SR: Would you say that RAMM is a participatory museum, in that the audience is involved in co-creating meaning and interpretation?

JP: I think we're at the start of that journey. Rick can probably answer in terms of the digital side, but in terms of the way that we curate exhibitions, we do have co-curation with partners, quite often, but they are institutional or artistic partners, rather than the meaning coming from visitors. We certainly involve visitors in terms of the experience, the audience participates in the space. But in terms of the actual creation, I don't think we're quite there in terms of exhibition content. It's an area that, if we're successful with our recent bid to the Arts Council, we're moving more towards. For an organization like RAMM, it's important to think how we stay true to our branding, our ethos or spirit. We're the home to a million thoughts, and invite other people to help tell the stories as well. That's the challenge for us in that area.

RL: On the digital side of things, it is something I'd like us to see doing even more, as there is a lot of potential. With museum trails, we've got the Exeter Time Trail digital trails that allow people to create their own content. We found that, with the collections website, having commenting enabled, simply having a contact form, has opened up another route for people to contact us with questions about the collections, or even simply objects they see on the website. That has given them

another avenue for direct participation with the staff at RAMM and the people, both locally and elsewhere. We have people contact us from Cyprus from seeing our blog and related objects on the collections explorer.

There's potential there for encouraging user-generated content. Mosaic Maker, which we had on Exeter Time Trail, was very successful. Schools took it up. We were getting sent so many mosaics, we could hardly keep up with it, between myself, a learning officer and a volunteer. We're looking at redoing this now, but in a more manageable way. That's something we learned early on: with digital, if successful, we need to make sure we can cope with that success, and respond to the people that are participating and engaging with us. This is something we now try to take into account, that if something does take off and people want to get involved, enjoy it and share it, they will, and it can grow very quickly, so we need to be braced and ready to deal with it. But there is definitely more scope. We had research done on digital in the galleries. We've got the digital tools to give more interpretation for people to respond and participate in the collections, either by sharing them with friends, or adding comments, or simply looking at more information than they can have in person in the museum. I'm working with our marketing people, trying to get little signs up to encourage people to do this, to make that connection between digital and physical, encourage the sharing of the experience online, and communicating with us. (...)

SR: What are the main challenges that you see the museum facing at the moment, and in the near future, both in general, and regarding audiences in specific?

JP: One specific to us is that we re-opened in 2012, after the redevelopment, and we had fantastic audience figures at the start, but inevitably, those are steadily declining. It's great when you're new, but then, when you're not new, you're not as popular. In terms of the financial environment, it's much more challenging these days with austerity, so we've had to try to raise more income. The contents on site that people come to see are, in a way, diminished since we re-opened. We turned one of the galleries into a shop, and there's more emphasis on retail and on corporate hire. All of those things slightly erode your public program, and the amount that you can offer for free. We've started charging for some exhibitions, which makes a difference to the sort of people who will visit on site, and the sorts of experiences they can have at RAMM. We're asked to a)

more income, but b) maintain or even increase our audiences, which is a tough thing to do. That's my immediate reaction to that question.

RL: It's interesting seeing how museums are being asked to generate income, and that includes on digital platforms, but your visitors may not necessarily like it if you start selling them things. We have done experiments to see how people respond to it. We have a simple online shop on the museum's group website, and we also have print on demand licensed images available. We've found that, with Twitter, people don't like it if you have a direct "hey, want to buy a print of this artwork?" approach. We've had negative comments and replies about that. But on Facebook, people seem much happier if you want to try and sell things. We have suggested that if we do want to do more digital, setting up a Facebook shop would be a sensible thing, because that's where people expect to be sold things. It's not like we're walking up to visitors and saying, "would you like to buy something?," it's more like visitors walking into our shop of their own free will. As Julien was saying, there's more constraints upon us, and more expectations as well, of what we can do to raise income. It's going to be difficult to manage those two together.

JP: We're also expected, because of the nature of our funding, which we get from the local authority, but we also - fingers crossed - get funding from the Arts Council, the Arts Council also have a particular agenda for audiences, which is specifically about increasing the diversity of our audiences. Demographically, we do very well in terms of representing all the different socio-economic groups in Exeter, but still, from the Arts Council, there's a need to increase your engagement with those audiences, the harder to reach audiences: people who live in particular parts of the city, or particular socio-economic groups, or the elderly. There's the need to meet that social agenda, because if we don't, we won't get access to some of the additional grants available. That's another layer to the challenge. (...)

SR: You mentioned the fact that digital is expected to create new audiences, or to reach new audiences, but that in practice, sometimes that's difficult to do and to evaluate. It might be happening, but you don't necessarily have the tools to see that. Do you feel like there are other expectations like that put on digital?

RL: Yes. Sometimes, when somebody has got an event running and they haven't sold many tickets, they'll come in and say to myself and Helen, can you put this on social media, please? And so, people noticed that they missed it, and they'll run and buy a ticket. We explain that it's like any other form of promotion, you need to plan it and allow plenty of time for it, so that you do not have a day before panic. It's not guaranteed to have a result.

JP: The perception in some of the museum communities is that the real experience and the virtual experience are two completely different strands. I remember we said whether we should put the website hits on the same graph as the museum visits. Actually, we can say they're the same, the activity on the site and the activity online. They're not separate at all. It's all trying to do the same thing, working together to increase the activity. It draws both onsite and online interaction.

RL: This is why, with the new website that we've worked on last year for the museum, I tried to make it visitor-focused, rather than reflecting the organization. Our previous website, set up and structured in 2007/08, was structured around the organization's aims and aspirations. That was fine, it worked, but we then had some years of Google Analytics, so we could see which parts of the website were important to our visitors. We then built a menu structure based on what the visitor looks at more. There are exceptions, because of people feeling the need to try something different and see what a new activity does, and play around with the menu. But by focusing on what our visitors want to see and use, it has given us a better website. It's also mobile-friendly now. From our point of view, it's helped us focus on being smarter with our content.

SR: Would you say that what we usually call the digital divide, a gap between the physical and the digital, is something that needs to be overcome in museums? Do we need to look at the physical, and the virtual / digital, as the whole experience of a museum?

RL: Definitely. Wherever you go, if you use a smartphone, you don't suddenly think, "oh, I'm going into a building, I must put it away". You'll still use it to contact people and find out more about the place you're in. It is a tool for improving your experience of whatever it is you're doing. There is the old perception of, when you plan your visit, you spend some time looking at the website, plan what you're

going to do, then you go to the location, and you have a physical experience. Whereas now, as we see everywhere, people are permanently connected. All the students who walk past our front door, for instance, from the college and the university, it is much more natural for them to carry on staying connected, sharing their experiences with their friends, and arranging to meet friends. Again, this is related to providing Wi-Fi. We were the first regional museum to offer free Wi-Fi, as far as I know. We acted as a pilot, and lots of other people built on our experience with it. It is a way of reminding our visitors that we are enabling that digital connection.

JP: I don't think we're anywhere near where we should be, because we still lack the acknowledgments in the object gallery, in the onsite, object galleries, that there's content online. There's a missing link there. (...)

SR: In your point of view, what does it mean for a museum to be playful or gameful?

RL: I'd say it's having an open and welcoming feel to it, and this is something RAMM does. We have a lot of activities within the galleries themselves: as you go around the museum over the course of the week, you'll see handling sessions going on in the galleries, and you'll see children joining in all sorts of workshops and events in the courtyard. It's a very open place, and I think that's where the redevelopment helped a lot, compared to the old museum. It helped the space and it let the museum breathe. It gives people permission to do things, to run around if they want. We have things like dress up as a Roman, where people take loads of selfies to share on social media. It encourages people to experience the museum. The physical interactives help do that as well, the touch screens and so on, helping people literally getting their hands on wherever possible.

JP: Having a sense of humour is important. It's something that people don't necessarily think about in museums. The gallery space has heavy weight issues, some really important things, but they're done in a way that makes them accessible. It is a place that's quite humorous, quirky and unexpected. To me, that's what being playful is: it's being smart, but not patronising, when engaging people in conversations. We don't tell people what they ought to be thinking, it's up to them what they think. We provide information and they can find some comments, but it's up to them what they think about the issues. We're not here to

lecture people. They ought to know that it's their views, and that their views are valid. There's a diversity of perspectives: everyone's got their own voice and their own perspective on issues. That's the important part of RAMM, its essence.

RL: We encourage people to let us know what they think. When we first had a new website in 2009, by simply having a contact us button and a form, inquiries shot up. People contacted us about all sorts of things. Again, having the physical cards that people can fill in, and the visitors' books, there's lots of routes we provide for people to give feedback, to comment on things, to let us know what they think. Social media has been a good platform for that as well. As you said, we can raise quite difficult issues. We have a dialogue, hopefully, rather than just saying to people, this is what this is.

JP: One thing that struck me as unusual about RAMM, when I first started working here, is that lots of different people feel comfortable coming to the museum. Teenagers, college students... People you wouldn't necessarily think or expect, not in this country, to get into museums. They wouldn't be perceived as very cool. RAMM does not try to be cool, RAMM is just RAMM. Our building helps, I think. This sort of Victorian gothic, it's a fairly over the top place to start. A different building might have a different character, so I think that helps. People feel quite comfortable in the sense that everyone feels like RAMM is their museum.

RL: There's definitely a sense of ownership. You talk to people who say things like, "I've been coming here since I was small, now I bring my grandchildren," or "I first came here with the school, and I still enjoy coming here". People are coming to the museum through different generations.

SR: So it's a space that people feel ownership towards, and maybe identify with, and also feel free to experiment on, a space that is not too constrictive?

JP: Over the last few years, we've done some brave subjects. We did Intimate Worlds, an exhibition that was about the history of sex, in a way. We did Gilbert & George, a show that had difficult content in a sense, rude words and stuff like that. People have been very trusting. They come in here and they feel like they are happy to be challenged, pushed a bit further than they would normally. It's not a conservative audience, they're open to different things. I think they feel that the staff, the people in RAMM, are there to introduce them to a new topic, a new subject. They trust the way that we curate the collection, the way that the program

is curated and put together. We try to balance things if we do a show like Gilbert & George. More than likely, somewhere else in the museum, there will be a show that appeals to a different audience. If you come with a group, it's likely that there's something there that is for you. One of the reasons that RAMM is successful is, if you have a group of people coming out, they're bound to find something in the museum that they're interested in.

RL: I like the fact that, even though it has been a few years since we've reopened, people still say, "oh, in this gallery you've muddled everything up!" It's not organized by the usual categories.

JP: It's one of the things that makes it playful. Some of the galleries are deliberately playful, like the juxtaposition of the giraffe and the harpsichord. That's a playful touch.

RL: It surprises people. Some people are outraged, which is nice to see, in a way.

JP: Offbeat is the word that is sometimes used to describe our galleries.

RL: When we were talking about the museum during the redevelopment, when we were working on our own branding, quirky came up a lot as well.

JP: There's a famous fashion designer, Paul Smith, who makes tailored suits that, from the outside, look like classic English suits, but when you open them, the lining is multi-coloured and really bright. That was one of the ideas that we used in RAMM, is that outside it is respectable, like you might expect, and then inside it is a bright, colourful, evocative experience. We wanted to go for bright colours in the galleries, part of the playful quirkiness as well. The architects wanted to paint it white and grey, and we said no, we wanted colour and pizzazz, and that is part of the development and the character. We developed the brand we were talking about, the quirkiness was developed at the same time as we were doing the galleries. The development of the idea and the physical manifestation of that idea were developed at the same time. The identity of the organization and the presentation of the collections in the building are two sides of the same coin. When it comes to digital projects, we want them to fit within that branding, that essence.

RL: This is why you'll find the odd thing. For example, we have Gerald the Giraffe doing a blog on Facebook every Friday. It's a nice way of letting people know

what's going on through social media. It's pretty popular. I can't remember how many years it's been going now, and he's still blogging every Friday, with faithful followers: about 500 people every Friday and Saturday read what Gerald has to say.

SR: Would you say that the museum is a blend of education, or learning, and entertainment?

JP: It's not education as in formal. It's learning through being inspired, rather than learning through formal processes. Some museums have a very pedagogic approach: these are the learning objectives, people will learn these things over a gallery, so they slot the answers to those questions into the text. It's not the way that we work. We're much more about understanding who our audiences are and what they want, thinking about the different segments of the audience. If you want to engage people, and people want to learn something, the first thing you do is grab their attention, get them involved, engaged, and then they will learn, because they've opened their minds to learning. I think that we've been successful with that.

RL: Yes, it's very much about getting people to think, rather than just giving them an answer. They can find their own answer.

JP: But when you ask people why they come to the museum, at the top of their list is to learn something, or to be inspired, so that's still the reason, the drive behind people's visit. But it's not choreographed like it is on some museums.

SR: So the strategy of the museum is not pedagogical, like you said, but more of a way of fostering curiosity, interest and inspiration.

JP: Yes, curiosity was the word that we kept coming back to. It binds together the original collectors of the museum and why they got to collect things. The Victorian era at that time was all about collecting as a form of curiosity and scientific endeavour. And also, thinking about why people come to the museum, it's about curiosity as well. It's a strong concept that binds everything together.

SR: The last question that I have is, what would you say are some of the aims for using game design at RAMM?

RL: Building on what we've discussed already, it is using that light and playful approach to present things, to tease people's curiosity, to get them to think about

what they're seeing, and what they're experiencing. It can be a great way of fostering discovery, either through a quest-type approach, or include competition. Who can find the most interesting thing, and why is it interesting? But also looking at very simple traditional museum activities that you could transform through gameful design. Someone going for trails, where we ask people to contribute content, or ask questions. Who's added the best photo? Who's added the most interesting question? Who's seen all the objects? We can do all sorts of things, from low level to big projects.

The ones we've done in the past, like the Roman Mosaic Maker, that was informative, but it was also try it yourself, make your own mosaic. And again, being RAMM, we didn't just say "do a Roman style mosaic like a workshop in Dorset might have produced, and sold in Exeter". Instead, have a completely modern pallet, including Barbie pink, and go wild! Make your own multi-coloured mosaic for a modern setting. It's using that playfulness to help people think, "this is something from the past, and I've applied it to the present. How do the two relate?" Interestingly, when looking at some of the trails we've done, even the paper trails we give out at the reception, watching people do those as a group, you see that the amount of conversation around the things they find as they're doing the trail is just as high as when they find what they're looking for. I think there's a lot of scope to do future things where we bring that playfulness, that exploration, sense of discovery, and again, using curiosity as an enabler, to encourage people to explore.

JP: We can get people to engage more deeply than just coming to see the museum or just visiting the website. We provide, for the onsite visitor, or regular visitor, lots of formal opportunities, such as lectures, talks and events. That appeals to some segments of our audience, but there are others who wouldn't want to come to formal lectures. With the time commitment, and the time of the day they happen, they become a self-fulfilling prophecy. They're held at lunch time, and the majority of the audience are people that are not at work, people that are retired. Obviously, to be successful you need to hold them at lunch time, because that means you get the audience back, but that's just one avenue for one group. There are other segments of the audience who don't have that time, who need to have other opportunities. Gameful design is another valid tool to engage different aspect of our audience, encouraging them to explore deeper.

RL: One of the things we do is we're working with external partners like Exeter College, where some of their students interpret the collections through dance. They're opportunities to bring someone from the outside, with a fresh pair of eyes, to produce something that's shared with our visitors.

JP: We're not very good at selling ourselves, but we've always been at the cutting edge. We reopened RAMM in 2012 and it was the Museum of the Year. The interpretation was there, and we want to stay at that level. To do that, we need to explore all the ways of engaging audiences, and game design is a really interesting way of doing it.

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A Machine to See With. Blast Theory, first presented 2010 at 01SJ Biennial, San Jose. [interactive performance]

Art Heist. Coney, 2010, New Art Gallery Walsall. [alternate reality game]

Capture the Museum. Thought Den and Splash & Ripple, 2013, National Museums Scotland. [multiplayer mobile game event]

Chore Wars. Kevan Davis, 2007. [online gamified platform]

Chromaroma. Mudlark, 2010, launched in London. [online gamified platform]

Cities: Skylines. Colossal Order, 2015, published by Paradox Interactive. [videogame]

Codebreakers. Fire Hazard Games, 2017 – 2018, Cambridge. [multiplayer mobile game event]

Darfur is Dying. Susana Ruiz, 2006. [videogame]

Day of the Figurines. Blast Theory, 2006, premiered at the Berlin Festival at the Hebbel am Ufer theatre, HAU2. [mixed reality game]

Desert Rain. Blast Theory, 1999, first presented at NOW 99 Festival, Nottingham. [mixed reality game]

Dungeons & Dragons. Gary Gygax and Dave Arneson, 1974. [roleplaying game]

Elder Scrolls series. Bethesda Softworks, 1994 – 2017. [videogame series]

Empire. Profound Decisions, 2013 – ongoing. [live action roleplaying game]

Europa Universalis series. Paradox Development Studio, published by Koch Media, 2001-2013. [videogame series]

Firewatch. Campo Santo, published by Panic and Campo Santo, 2016. [videogame]

Fitocracy. Richard Talens and Brian Wang, 2010. [online gamified platform]

Foldit. University of Washington, Center for Game Science, Department of Biochemistry, 2008. [videogame]

Ghostwriter. Blast Theory, 2011, Royal Albert Memorial Museum & Art Gallery, Exeter. [interactive audio tour]

Habitica. HabitRPG Inc, 2013. [online gamified platform]

Halo 2. Bungie, published by Microsoft Game Studios, 2004. [videogame]

Hidden Museum. Aardman, University of Bristol, and the Bristol Museum, 2016. [mobile game]

Hunt for the Cheshire Cat. HiddenCity, 2017 – ongoing, London. [mobile game event]

I Love Bees. 42 Entertainment, 2004. [alternate reality game]

I Like Frank. Blast Theory, 2004, Adelaide Fringe, Adelaide. [mixed reality game]

Ingress. Niantic, 2012. [mobile game]

Kidnap. Blast Theory, 1998, first presented in Architecture Foundation, London. [interactive performance]

Lego Racers 2. LEGO, 2001 [videogame]

Life is Strange. Dontnod Entertainment, published by Square Enix, 2015. [videogame]

Lorien Trust. Merlinroute Ltd., 1992 – ongoing. [live action roleplaying game]

Minecraft. Mojang, published by Mojang, Microsoft Studios and Sony Computer Entertainment, 2009. [videogame]

Mystery at Frankenstein's Lab. Atomic Force Productions, 2018, Science Museum, London. [escape game]

Neverwinter Nights. BioWare, published by Infogrames and MacSoft, 2002. [videogame]

Operation Black Antler. Blast Theory, 2016, first presented at Brighton Festival, Brighton. [interactive performance]

Pac-Man. Namco and Atari, 1980. [videogame]

Pac-Manhattan. Frank Lantz and students in NYU's Interactive Telecommunications Program, first presented 2004. [mixed reality game]

Perplex City. Mind Candy, 2005. [alternate reality game]

Pokémon Go. Niantic and The Pokémon Company, 2016. [mobile game]

Raiders of the Lost Archive. Fire Hazard Games, 2016 – ongoing, Victoria and Albert Museum, British Museum, Museum of London, and V&A Museum of Childhood. [multiplayer mobile game event]

REXplorer. Steffen P. Walz and Rafael “Tico” Ballagas, 2007, Regensburg, Germany. [mobile game]

Second Life. Linden Lab, 2003. [online virtual world]

Secret Cinema Presents: Blade Runner. Secret Cinema, 2018, London. [interactive cinema event]

SimCity. Maxis, 1989. [videogame]

SuperBetter. Jane McGonigal, 2012. [online gamified platform]

The Celestial Chain. Time Run, 2017, London. [escape game]

The Drones. Coney, 2016 – 2018, London. [interactive performance]

The Rowley Riddle. Red House Mysteries, 2018, Royal Albert Memorial Museum & Art Gallery, Exeter. [escape game]

The Walking Dead. Telltale Games, 2012. [videogame]

Treasure Hunters. Aardman, 2018, Science Museum Group, [mobile game]

Ulrike and Eamon Compliant. Blast Theory, 2009, first presented at the 53rd Venice Biennale, De La Warr Pavilion, Palazzo Zenobio, Venice. [interactive performance]

Ultima Online. Origin Systems, Electronic Arts, Mythic Entertainment, Broadsword, published by Electronic Arts, 1997. [online game]

Uncle Roy All Around You. Blast Theory, 2003, first presented at the Institute of Contemporary Arts, London. [mixed reality game]

World of Warcraft. Blizzard Entertainment, 2004. [online game]

World Without Oil. Ken Eklund, 2007. [alternate reality game]

Zombies, Run!. Six to Start, 2012. [mobile game]